INSURV INSTRUCTION 4730.2D

From: President, Board of Inspection and Survey

Subj: TRIALS AND MATERIAL INSPECTIONS OF SUBMARINES

Ref: (a) OPNAVINST 4700.8 (series)
(b) OPNAVINST 4730.7 (series)
(c) OPNAVINST 4730.5 (series)
(d) CNO WASHINGTON DC 252203Z SEP 98 (NAVOP 009/98)
(e) CINCLANTFLT/CINCPACFLT 4790.3
(f) OPNAVINST C3501.2 (series)
(g) OPNAVINST C3501.37 (series)
(h) OPNAVINST C3501.309
(i) OPNAVINST 3501.293
(j) OPNAVINST 5100.19 (series)
(k) OPNAVINST 5100.23 (series)
(l) OPNAVINST 5090.1 (series)
(m) COMSUBLANT/PAC INST 5400.39
(n) COMSUBLANT/PAC INST 5090.5

Encl: (1) INSURV Submarine Trial/Inspection Guidance Manual

1. Purpose. To provide guidance in the preparation for, and conduct of, trials and inspections of submarines by the Board of Inspection and Survey (INSURV). This instruction provides information to assist responsible authorities in preparing submarines for presentation to the Submarine Board of Inspection and Survey. This instruction has been substantially revised and should be reviewed in its entirety.

2. Cancellation. INSURVINST 4730.2C.

3. Background. 10 U.S.C. 7304 requires a Board of Naval Officers to periodically conduct a material inspection of each naval ship and requires a report to the Secretary of the Navy when a ship is found unfit for further service. The material condition of all ships inspected is reported to the Chief of Naval Operations. The Board is also tasked by reference (a) to conduct trials as an independent verification of the readiness of new construction submarines for acceptance for naval service. References (b) through (e) provide further guidance for the scheduling and conduct of submarine trials/inspections.

4. Action.

a. Procedures for conducting trials and inspections shall be specified by the President, Board of Inspection and Survey as directed in reference (c). This instruction provides the required procedures for the crews of the inspected ships.

b. Each INSURV Inspector is responsible for maintaining an up to date Inspector's Guide (IG) to ensure a consistent and standard inspection.

c. The Submarine Board, ships and authorities responsible for presenting ships for a Trial or Inspection to INSURV will be guided by enclosure (1).

W. R. SCHMIDT

Distribution:
ASSTSECNAV RDA (ships)
CNO (N43, N6, N87)
COMNAVSEASYSCOM (PMS 350, 392, 401, 425, 450, SEA 08, SEA 92)
COMSPAWARSYSCOM (PMW 156, 173)
COMNAVSUPSYSCOM (SUP 04)
CINCLANTFLT (N43)
CINCPACFLT (N43)
COMSUBLANT (N43)
COMSUBPAC (N4)
SNDL-FKP8 (SUPSHIPS)
SNDL-FKP7 (NAVSHIPYARDS)
NAVSEA DET SUBMEPP PTSMTH (Code 1851)
FTSCLANT (Code 4100)
FTSCPAC (Code 405)

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INSURV SUBMARINE TRIAL/INSPECTION
GUIDANCE MANUAL

CHAPTER ONE
GENERAL ADMINISTRATION AND GUIDANCE

1-1. Introduction. This chapter provides background, general guidance, administrative requirements, and instructions to the Responsible Authority for the advance preparation for an INSURV Trial/Inspection.

1-2. Background. The Board conducts Inspections and Trials as an independent verification of the material condition of submarines. This includes:

a. Readiness of new construction submarines for acceptance for naval service after presentation for delivery.

b. Fitness of active submarines for continued service.

c. Navy Occupational Safety and Health (NAVOSH) and Environmental Protection program compliance is reviewed as directed by the Chief of Naval Operations.

d. Surveys prior to decommissioning are not normally conducted on nuclear powered submarines.

1-3. Responsibility. The Responsible Authority and the Board of Inspection and Survey have specific responsibilities as follows:

a. The Responsible Authority is the officer or commander designated to prepare and present the ship. This is normally the Supervisor of Shipbuilding (SUPSHIP) or the Naval Shipyard Commander for a Combined Trial (CT). The Type Commander is the Responsible Authority for a Guarantee Material Inspection (GMI) or Material Inspection (MI); however, most tasks are usually delegated to the Commanding Officer of the ship. The Responsible Authority will:

(1) Coordinate with the INSURV scheduler to establish a Trial/Inspection date.

(2) Propose a Trial/Inspection agenda. For new construction, the proposed agenda shall be forwarded by SUPSHIP to the Board at least 30 days prior to the inspection. For Material Inspections, the proposed agenda should be submitted to the Board at least one week prior to arrival, and should follow the general guidelines of Appendix A.

(3) Ensure the ship is adequately prepared. This means that a ship presented for acceptance (CT) is complete. Any incomplete items require a waiver by the Chief of Naval Operations (reference (a)). A ship presented for a MI should be ready for

prompt, sustained combat operations at sea. Ships that do not meet these criteria should not be presented for trial/inspection.

(4) Ensure the safe and expeditious presentation of the ship to the Board. The Responsible Authority should take the initiative and aggressively carry out the agenda, keeping the Board informed of progress. Schedule modifications required by casualties or other circumstances should be made with the concurrence of the INSURV Senior Member. The Board will normally not observe the operation of a piece of equipment that did not function correctly on its first opportunity. If a deficient material condition is corrected, the Board will document the deficiency and note its correction.

(5) Designate an INSURV Coordinator to ensure the safe and expeditious execution of the schedule. The Board recommends assignment of an experienced officer qualified in submarines to serve as INSURV Coordinator.

(6) Arrange and coordinate required support services.

(7) Ensure that shipyard/shore maintenance facility and ship's force work is limited and coordinated to not interfere or conflict with the inspection.

(8) Representatives of the ship, and the shipyard if appropriate, may be assigned to accompany the inspectors if so desired by the responsible authority.

(9) Provide a designated representative to attend the out brief (normally the ISIC).

b. The INSURV Board will:

(1) Provide a package of information to aid in preparation for the Trial/Inspection at least 45 days in advance of the Trial/Inspection date.

(2) Comment on the agenda proposed by the Responsible Authority.

(3) Document findings and provide a copy of deficiencies to the Responsible Authority.

(4) Upon completion of the Trial/Inspection, brief the ship's Commanding Officer and ISIC on the findings and significant deficiencies identified.

(5) Issue a message report on the results of the Trial/ Inspection.

(6) Make recommendations regarding the acceptability of new construction submarines for delivery (Combined Trial) or

recommendations to remove a submarine from service (Material inspection) if required.

1-4. Liaison with the Board. To ensure that conduct of the Trial/Inspection is orderly and efficient, early liaison with the Board is strongly encouraged. The Board assigns a Recorder for each Trial/Inspection who acts as the single point of contact for questions regarding the agenda and administrative support. Inspectors for each individual area are also available to resolve questions within their area. Early problem resolution is essential for a successful inspection. The following is a list of INSURV phone number extensions: [Comm (757) 462-7693; DSN 253-7693; FAX 462-7090]

Office	Extension
Staff Administrative Officer	x-3002
Submarine Board	
Senior Member/Damage Control, Habitability	x-3037
Electrical Inspector	x-3018
Auxiliaries Inspector	X-3016
Main Propulsion/Reactors Inspector	x-3017
Navigation/Operations Inspector, Interior Communications	x-3015
Weapons/Deck Inspector	x-3019
NAVOSH Inspector/Medical, Environmental Protection/Supply	x-3070

1-5. Deficiencies. The Board will evaluate the ship against standards set forth in documents such as the Building Specifications for Submarines, Technical Manuals, Ship System Manuals, Test Loads/Methods Drawings, Quality Assurance Manual, and the Preventive Maintenance System. Deficiencies will document where the ship does not meet these standards.

1-6. Schedule.

a. MI, CT: A Material Inspection (MI) or Combined Trial (CT) normally lasts four days and generally follows the outline below:

1st Day - Pre-underway system checks, if applicable, and underway operations.
2nd Day - Underway operations.
3rd Day - Return to port/Ship prepare Open and Inspect items.
4th Day - Open and Inspect/Ship debrief.

b. GMI: A Guarantee Material Inspection (GMI) normally lasts three days. This generally consists of verifying the status of all deficiencies identified during the Combined Trial, and Inport Operation/Open and Inspect of selected equipment. The GMI normally includes an at-sea period.

c. MI, CT, GMI: Trial/Inspection events should be scheduled using Appendix A as a guide. The ship should be opportunistic in adjusting the trial schedule during the inspection, especially while underway. Liberal use of the 1MC is requested to expedite and coordinate events.

d. The schedules in Appendix A have been developed over time using lessons learned from past inspections. The early afternoon underway on the first day will usually get the submarine back on the third day in time to install the sail race track and VLS platform in support of testing on the fourth day.

e. Guidance Notes (Chapters 2 through 13) provide direction for the inspection of individual areas, including a general list of open & inspect equipment that may be scheduled to be opened for inspection. As a result of underway observations during the inspection, equipment may be added or deleted from the Open and Inspect List. These additional items will be inspected at a convenient time agreed upon by the ship and inspector.

1-7. Administration and Support.

a. Berthing and Office Spaces: The Board will require dedicated berthing and office space while on board.

(1) For SSNs, this requires exclusive use of the Wardroom and nearby berthing (i.e. 21-man bunk room, not Wardroom Staterooms). For SSBNs, exclusive use of the Crew's Lounge is preferred, with berthing in adjacent missile compartment 9-man bunkrooms.

(2) The Senior Member will berth in the XO’s stateroom or with the rest of the Board as the ship desires.

(3) Based on Recorder inputs, the ship should provide a list of bunks available for use by Board members. The Recorder will assign berthing of Board members to specified bunks.

b. Provide the following to the Senior Member upon the Board's arrival:

(1) The Commanding Officer's (PCO’s as appropriate) personal letter outlining material problems worthy of special note and any concerns he may have (JSNs should be included if assigned).

(2) A hardcopy of all active CASREPs the day the Board arrives (MI/GMI). Only the original CASREP is required, no updates.

(3) A list of cannibalization or diversion actions, with the circumstances for each.

(4) Record of Departures from Specification (MI/GMI).

(5) NAVSEA Pre-Sea Trial Audit (CT, post overhaul/DMP MI only).

(6) Certification of minimum habitability standards as required by the Shipboard Habitability Program (CINCLANTFLT/CINCPACFLT 9640.1) (CT only).

(7) Certification as to contract fulfillment (CT only):

("In construction of the USS _____ SS(B)N___ the contract, plans, specifications and changes thereto have been satisfactorily fulfilled except as noted below." (Summarize by departments; if none, so state.)

(8) Date the Commanding Officer assumed command. Date of ship's commissioning and the type, length, location and date of the most recent major maintenance period (SRA, ERP, DMP, or Overhaul).

(9) List of equipment which should be carried by the ship, but has been "borrowed" to support the trial/inspection.

c. The following reports, data, and publications should be available for use:

NOTE: Leave asterisked (*) material in the normal filing location for presentation to inspectors on request. Provide a list of missing items to the recorder.

*(1) All contracts, specifications, a booklet of general plans (including all the latest revisions), essential correspondence files and records, and a corrected copy of the specifications or circular of requirements.

(2) The Responsible Authority shall prepare a statement of the status of contractor and government furnished repair parts, which shall include a list of critical shortages identified by the ship's Commanding Officer. This list is in addition to, and follows the same format as, the official shortage list. To designate an item "critical" it must be considered essential that the item be on board prior to acceptance or delivery. The recommendations of the Commanding Officer are to be obtained and incorporated in the list of critical shortages (CT only).

(3) Training Aid Booklet.

*(4) Stability characteristics for the ship with the Equilibrium Polygon and Moment Diagram. Weight and location of temporary lead ballast. Inclining Experiment data.

*(5) Rotating machinery baseline structureborne noise survey data.

*(6) COSAL

*(7) Ship Information Book/Ship Systems Manual (all volumes).

*(8) NAVSHIPS Technical Manual and Equipment Technical Manuals.

*(9) Test Memoranda (CT, post overhaul/DMP MI only).

*(10) Copy of Builder's Trials Data Sheets (CT only).

d. Provide additional support as follows:

(1) Reserve three designated parking spaces near the ship (five for Norfolk ships).

(2) All officer members will eat in the wardroom (working meals) on SSNs, and normally all but the senior member will eat in Crew's mess on SSBNs.

(3) Foul weather clothing if conditions warrant.

(4) A laser printer during the period of the inspection, staged in the INSURV working area.

(5) The following materials should be assembled in the Board's working space prior to the Board's arrival:

(a) A folder for each inspection area with:

1 A copy of the specific area section of the last INSURV report which has been screened and outstanding items highlighted. If an item has been corrected since the last inspection and it has recurred, mark it as being completed and document it in the CSMP as a new item.

2 Copy of OOC log.

3 List of equipment for which PMS coverage is missing or inadequate.

4 Copy of ship's inspection agenda.

5 Copy of the Commanding Officer's letter of concerns.

6 Copy of any particular items asked for in the individual sections of this instruction.

e. Provide the ship’s CSMP electronically to the INSURV recorder. The ship’s INSURV coordinator should work directly with the INSURV recorder prior to the start of the inspection to ensure the proper format is used.

CHAPTER TWO
AUXILIARIES GUIDANCE NOTES FOR DEPARTMENT HEADS, DIVISION OFFICERS AND SUPERVISORS

2-1. Preparations.

a. On arrival, provide to the Inspector a package tailored to the Auxiliaries (AX) inspection area containing the information listed in Chapter 1, Section 7 and the items following:

(1) Copy of ship's trim and drain pump technical manual(s) and scrubber technical manual.

(2) Copies of the last seven days of underway Below Deck's Watch or Auxiliaryman Forward Logs and the last seven days of HPAC, HPAD, LPAC, LPAD, and hydraulic power plant logs.

(3) Copy of PMT data on HP air bank and HPAD tower dew points (taken Friday or Monday prior to the inspection start).

b. The following documents will be reviewed during the inspection:

(1) The last diesel inspection and trend analysis records.

(2) Flexible hose records.

(3) Navy Oil Analysis Program (NOAP) records.

(4) Logs taken during the inspection.

2-2. Inspection Routine.

a. The inspection is material oriented and normally consists of two phases: Underway phase, and open and inspect phase. Upon completion of the inspection, the findings will be debriefed. The duration of the inspection is usually four days.

b. PMS Maintenance Requirement Cards are the primary references for equipment inspection. NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines are also used.

2-3. Underway Phase. During the underway phase equipment is checked to design specifications in an operational environment. The underway phase usually starts the afternoon of the first day and is completed by the afternoon of the third day for MIs. The underway phase is comprised of an outbound surface transit, a submerged period, a test depth period, and an inbound surface

transit. More detail is provided in Appendix A. Some of the demonstrations that are conducted during this phase include:

a. Surface transit periods:

(1) Steering gear testing ahead and astern.

(2) Testing of the spare diesel engine governor (on return to port).

(3) TDU muzzle ball valve leakage (where PMS requires measurement while surfaced and at 200 feet, if time constraints and priorities permit).

b. Submerged period:

NOTE: EMBT blow is the last submerged evolution. The ship should ensure that all required submerged evolutions have been completed prior to this event, including:

(1) Operation of atmosphere control equipment.

(2) TDU testing (interlock checks and muzzle ball valve leakage checks).

(3) High speed steering/diving gear testing.

(4) Steep angle equipment operation testing.

(5) Diesel engine operation. The diesel should be warmed up on the surface just prior to submerging to periscope depth.

(6) Automatic Maneuvering System/Depth and Course Keeping System (if installed). Demonstrate satisfactory operation of the Automatic Maneuvering System/Depth and Course Keeping System as directed by the INSURV Inspector.

(7) EMBT blow demonstration. (The Type Commander requires an escort vessel if this is done from test depth as it is during CT).

c. Test depth period:

(1) Test control surfaces for binding. (At test depth minus 100 feet where the control surfaces will be fully cycled [Hard stop to Hard stop]).

(2) Perform trim, drain, and sanitary pump capacity checks (as applicable).

(3) Cycle MBT vent valves in hand and power to check for binding.

(4) Demonstrate the ability of atmosphere control

equipment to pump overboard.

(5) Test emergency flood control system (except TDU flood control which is tested during TDU testing and depth control when forbidden by ship's procedures).

(6) Perform a capacity test of the external hydraulic system's pumps (can be performed at other times in agenda, but manning usually supports performing during weapons handling at test depth).

d. Return to Port: SSNs conduct selected portions of URO/MRC-16. Testing needs to be conducted as soon as possible after the ship is moored to prevent interference with hanging diver and sail tagouts. The submarine should be moored to allow extension and full throw cycling of the bow planes if applicable. SSBNs schedule CADET to complete URO/MRC-16 following the INSURV inspection and forward the data to INSURV.

2-4. Open and Inspect Phase. The INSURV Inspector will establish the list of equipment to be inspected during the open and inspect phase. The list will be given to the ship's INSURV coordinator during the inbound transit. As conditions permit and ship's force can support, these items may be looked at during the underway phase or inbound transit. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the inspector's return at 0800 following the underway period. The significance of being completely ready at this time cannot be overemphasized. The following is a list of systems or components that may be inspected during this phase, depending on the conditions observed while underway. Equipment will be added and deleted from the list as appropriate.

a. Hydraulics.

(1) At least one hydraulic pump discharge and return filter for each major system as applicable (main, port, starboard, lead, vital, steering and stern diving, external)(CT only).

(2) Rudder, stern planes, and fairwater (Bow) planes in-line servo control valve filters (CT only).

(3) Any filter with out-of-specification readings.

b. Air system components.

(1) Two EAB system filters (one forward, one aft)(CT only).

(2) One main ballast tank blow check valve (open and disassemble, remove main stem, poppet, and software).

(3) One EMBT blow valve (open/disassemble/take stack

height readings of ball and seat).

NOTE: A main ballast tank blow check valve and an EMBT blow valve will be disassembled routinely on CTs. For GMIs and Mis they will be disassembled only if problems are noted during the underway portion of the inspection.

c. Open the HP Air Dehydrator.

(1) Remove both tower plugs for desiccant inspection (often not requested depending on dew points).

(2) Remove prefilter and after filter.

(3) Open one suction side CUNO filter bowl and remove the filter elements.

d. Open one HP air compressor.

(1) Remove one head assembly (fourth or fifth stage). Remove piston assembly (2nd/4th or 3rd/5th) and associated connecting rod bearings if directed by inspector.

(2) Remove the suction and discharge valves from associated compressor stages.

(3) Open the motor coupling housing.

(4) If directed by the Inspector, take connecting rod bearing clearances and cylinder liner/piston roundness measurements using the technical manual procedure.

e. Diesel Engine.

(1) Remove inspection covers as designated by the Inspector from upper crankcase, lower crankcase, air box, exhaust header, and vertical drive gears.

(2) Remove blower discharge end access/inspection cover and take available blower clearances.

(3) Open the diesel lube oil and fuel oil filters.

f. Perform the following on one refrigeration compressor if operational parameters warrant (a refrigerant reclaim unit may be required to support this inspection):

(1) Remove the in-line suction strainer.

(2) Remove the dehydrator cartridge.

(3) Remove all heads, pistons, and cylinder liners if

directed by the Inspector (seldom requested).

g. Perform the following on the low pressure blower:

(1) Drain and open the lube oil sump (only if directed by Inspector).

(2) Open the knife-edge strainer if directed by the inspector.

(3) Remove suction pipe. Take internal clearances with the Inspector, if operational parameters warrant disassembly.

h. Open the trim pump suction strainer. (If convenient, coordinate with the E-Div Inspector to occur at same time pump is tagged out for motor inspection.)

i. Open the drain pump duplex suction strainer (both drain pump suction strainers on SSBN 726 class submarines).

j. Open/disassemble one trim or drain system ball valve (no bilge suction or firefighting connections). (CT only)

k. Open one variable ballast tank. (CT only)

l. Atmosphere control equipment open and inspect list.

NOTE: All or portions of this may be accomplished at any time during the inspection as conditions permit.

(1) Open one CO/H2 burner:

(a) Remove catalyst bed fill plate.
(b) Remove air filter.
(c) Remove heater cover-plate.
(d) Remove lithium carbonate bed access plates.
(e) Coordinate with the Electrical Inspector and open control box cover.

(2) Remove blower discharge end access/inspection cover and take available blower clearances Open the oxygen generators.

(a) Remove cell area cover plates.
(b) Replace ST-502 (De-ionized water filter) and ST-702 (Cooling water filter); place old filters into separate poly bags for inspection.

(3) Open one CO2 scrubber.

(a) Remove resin bag compartment cover plates.
(b) Remove STR-1 (Rich MEA strainer); STR-2 (Lean MEA strainer); and STR-3 (CO2 overboard strainer) and place contents in separate poly bags.
(c) Remove heater cover-plate.

(d) Remove boiler float valve.
(e) Obtain a one ounce sample of compressor oil.

k. Lift check one relief valve. (CT only)

2-5. Special Procedures. Although ship's operating procedures and PMS cards are usually the primary guides for evaluating equipment performance, INSURV has developed the following procedures for circumstances where the operating procedure or PMS does not address the testing desired.

2-6. Steep Angle Operation.

a. Operate the ship through three complete up/down cycles of 25 - 30 degrees. Wait two minutes after each depth change on the first cycle to allow for possible damage reports, then complete two cycles without pausing.

b. Equipment normally in operation while underway should be in automatic mode as required to support evolutions.

c. The ship should be rigged for deep submergence to permit maximum depth excursion that will allow the large angle to be held for a long enough time to evaluate equipment performance.

d. The O2 generator(s) and all CO2 scrubbers will be operating at the commencement of this event.

2-7. Deep Dive. Submerge the ship to a keel depth equivalent to test depth minus 100 feet for performance of step 2a below.

a. Planes and Rudder. (Test depth minus 100 feet). Cycle planes and rudder through one full throw to check for binding. For ships with the fair water planes ram in the bridge access trunk, this requires the lower hatch to be opened.

b. Proceed to test depth and remain at that depth to make observations as required by the Board.

c. Trim and Drain Pump. Pump from a variable ballast tank to sea, at maximum designed operating parameters as specified in the pump technical manual for ten minutes. Suction should be from a non-pressurized tank and discharge should be overboard by the nearest route. For SSBN 726 class, both forward and after drain pumps will be demonstrated. For trim purposes, the ship’s control party should estimate the amount of water to be pumped at 110% capacity. Most ships prefer to bring on approximately half of that water before the first pump capacity check, pump for ten minutes after the pump is brought up to speed. When the test is complete, bring on water for the next check.

d. Atmosphere Control Equipment. Equipment should be

operated to ensure that applicable units are capable of discharging to sea.

e. Main Ballast Tank Vents. Hand cycle MBT vents and then cycle hydraulically using the control valve.

f. Flood control testing for Hovering/Depth Control Systems (If allowed by ship's procedures, if not perform at 200 ft.).

(1) Cycle (normal open and emergency shut) hovering system hull and flood/drain valves for depth control tanks.

(2) Cycle depth control tank flow control valve through a full throw.

g. Sanitary Pump. Pump from a sanitary tank to sea for ten minutes to determine pump capacity.

h. Machinery room flood control. Use URO/MRC 25 as a guide.

2-8. Diesel Generator and Snorkel Safety System.

a. Conduct diesel trend analysis as directed by the Inspector using Preventive Maintenance System as a guide (may not perform full trend). For a CT, the diesel trend can be conducted upon securing the maneuvering watch on the outbound transit.

b. Check the diesel engine snorkel safety system with applicable MRCs.

c. Demonstrate satisfactory operation of the diesel generator while snorkeling. Satisfactory operation means that all operational parameters are maintained within specifications listed in the diesel technical manual.

d. After the diesel trend analysis is completed, install the spare governor while the ship is submerged. This should be done just prior to surfacing. Check its operation during the surface transit back to port.

4. Surface Steering Gear Operation. Observations are made at the rudder ram. Communications should be manned between control and shaft alley.

a. Surface Ahead Steering Gear Operation.

(1) With the ship at maximum speed, move the rudder from 0° to hard left, then to hard right, and then back to 0° using normal hydraulic power. Repeat the procedure, moving in the opposite direction first (right to left).

(2) Perform step 1a (1) using emergency hydraulic power.
b. Surface Astern Steering Gear Operation.

(1) With the ship backing at maximum sustained engine revolutions, move the rudder from 0° to hard left, then to hard right, and then back to 0° using normal hydraulic power. Repeat the procedure moving in the opposite direction first (right to left).

(2) Perform step 1b (1) using emergency hydraulic power.

2-9. Submerged Steering and Diving Gear. Timing of all control surfaces is done at the local indicator. Communications should be maintained for operation of stern planes, fairwater/bow planes, and rudder. Operations should be performed at the maximum speed at which full throws are permitted by the submerged operating envelope.

a. Submerged Steering Gear Operation.

(1) Move the rudder from 0° to hard left, then to hard right, then back to 0° using normal hydraulic power. Repeat the procedure moving the rudder right to left, then back to 0°.

(2) Perform step 5a (1) using emergency hydraulic power.

b. Stern Plane Operation.

(1) Move the stern planes from 0° to hard rise, then to hard dive, and then back to 0°, using normal hydraulic power. Repeat the procedure moving the planes from dive to rise.

(2) Perform step 5b (1) using emergency hydraulic power.

c. Fairwater Plane Operation (as applicable).

(1) Move the fairwater planes from 0° to hard rise, then to hard dive, and then back to 0° using normal hydraulic power. Repeat the procedure moving the planes from dive to rise.

(2) Perform step 5c (1) using emergency hydraulic power.

d. Bow Planes Operation (as applicable).

(1) Move the bow planes from 0° to hard rise, then to hard dive, and then back to 0°, using the normal hydraulic power. Repeat the procedure moving the planes from dive to rise.

(2) Perform step 5d (1) using emergency hydraulic power.

2-10. TDU Muzzle Ball Valve Leak Check. TDU interlock testing

can be performed any time after ship's underway (per PMS MRC A-096/Q-3 or Q-4 depending on hull at the date of this instruction). At the completion of this test, the TDU should remain flooded to support muzzle ball leak testing. If testing is not supported by the ship's PMS deck, the procedure below should be used. If leak testing appears in the PMS deck (A-096/S-4R, 8M-4R, or S-2R at the date of this instruction), the PMS procedure should be used. Leak testing on the surface is not required for a MI, especially if transit time on the surface is limited.

a. Ensure the ship is at 200 ft.

b. Obtain permission to conduct a leak check. Obtain permission to break rig for dive on the TDU vent valve.

c. Remove the vent valve funnel.

d. Connect poly tubing to the vent valve discharge line.

e. Crack open the vent valve (slowly). Establish flow after allowing hull compression to be vented.

f. Measure flow into a beaker for five minutes.

g. Close the vent valve, remove the poly tubing and reinstall the funnel. Rig the TDU for dive.

h. Determine the leak rate of the TDU muzzle ball valve by measuring leak-off in a graduated cylinder. Compare this leakage with ball valve specifications.

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CHAPTER THREE
ELECTRICAL GUIDANCE NOTES FOR DEPARTMENT HEADS, DIVISION OFFICERS AND SUPERVISORS

3-1. Preparations.

a. On arrival, provide to the Inspector a package tailored to the Electrical (EL) inspection area containing the information listed in Chapter 1 Section 7 and the items below:

(1) Tables 3-1, 3-2, 3-3 and 3-4 with filled in data. (Tables can be found at the end of this chapter).

(2) Detroit Pressure Switch data on Tables 3-5, 3-6, 3-7 or 3-8 with completed data as applicable to your ship class. (Tables can be found at the end of this chapter).

(3) The Battery Record Book and Degaussing Folder.

3-2. General Information. The below listed materials will be required to support the inspection:

a. An operational and calibrated strobe tachometer or photo tachometer.

b. Brush tension gage.

c. Gap micrometer or non-metallic gages for measuring brush box to slip ring/commutator clearances.

d. Depth micrometer for measuring the Diesel Generator pedestal bearing wear.

e. Safety equipment as required for conducting visual inspections of energized equipment, not to break the plane (e.g. rubber gloves, rubber matting).

f. Calibrated multimeter and a calibrated ohm meter.

3-3. Inspection Routine.

Background

a. The inspection is material orientated and normally consists of two phases: underway phase, and open and inspect phase. Upon completion of the inspection, the findings are debriefed. The duration of the inspection is usually four days.

The majority of the electrical inspections are energized, not-to-break-the-plane open and inspects, which are carried out throughout both phases. Few inspections and evolutions affect the entire ship, but most do affect another division, so close coordination is required. Nearly all electrical inspections can be performed during any portion of the MI and every effort should be

made to complete the inspection before the open and inspect day. Look for opportunities to bring things forward in the inspection.

b. PMS Maintenance Requirement Cards are the primary references for equipment inspection. NAVSEA technical manuals, equipment technical manuals, Type Commander's directives and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines are also used.

c. Switchboard and other inspections are performed while the equipment is energized. Safety of equipment and personnel is of the utmost importance. The Board will use the ship's safety precautions for all evolutions.

d. It is essential that a proper closeout process be in place for restoring electrical equipment to fully operational condition after it has been inspected. This is especially important in the fast-paced inspection environment. Critical equipment can be significantly damaged by inadvertently leaving commutator brushes uninstalled, then attempting to operate the equipment.

3-4. Underway Phase. The underway phase starts on the first day of the inspection and is usually complete by the afternoon of the third day. (Equipment should be de-energized and danger tagged for inspection unless otherwise noted or approved by the ship and the inspector). During the underway phase equipment is checked to design specifications in an operating environment, and by internal inspections. The underway phase is comprised of an outbound surface transit, a submerged period, a test depth period, a second submerged period (if required), and an inbound surface transit. Some of the inspections and demonstrations that are conducted during this phase include:

a. Trim and trim priming pump motors, resistor, rheostat and controllers, includes both NR 1 and NR 2 Trim pumps for SSN 21 class. (Coordinate with the Auxiliaries Inspector to perform simultaneously with strainer inspection if practical).

b. Drain and drain priming pump motor(s), resistor(s), rheostat(s) and controllers. (Coordinate with the Auxiliaries Inspector to perform simultaneously with strainer inspection if practical).

c. 400 Hz motor generators and controllers.

d. 250 VDC, 450 VAC switchboards, and 450 VAC fuse panels (involves inspections in the vicinity of energized gear).

e. Ship service motor generators. Overspeed test one of the SSMGs.

f. Both ship service turbine generator (SSTG) collector

housings, cable junction boxes, shaft grounding brush assemblies.

g. Secondary propulsion motor interlocks and operating gear.

h. Battery well and ICV panel inspection. (Tagout not required.)

i. Laundry equipment inspections and operational tests.

j. EPCP and SSN 21 Auxiliary EPCP. This involves inspections in the vicinity of energized gear.

k. EPM/EPTG controller cabinet and motor. Includes the EPM control cabinet in maneuvering for SSN 21 Class.

l. CO-H2 Burner controllers.

m. Ultrasonic sink generator.

n. CO2 Scrubber controller.

o. Various motors and controllers.

p. Submersible pumps and controllers.

q. EPM operations. (See section 3-3)

r. SPM operations. (See section 3-3)

s. Shaft grounding device inspection and shaft voltage checks. Specific shaft turns are required for some ships to perform shaft voltage check procedure.

t. Electrostatic precipitators.

u. Vent fog precipitators.

v. Normal lighting systems.

w. Sound silencing program.

x. Inspect diesel generator, associated electrical cabinetry, and measure pedestal bearing wear. Normally this is performed during test depth operations. (Tagout required)

y. Shore power joy plug connections. For SSBN 726 class, prepare to inspect shore power trunks during return to port. Other class ships are inspected underway, usually during test depth operations when the Damage Control Inspector is checking the escape trunks.

3-5. Open and Inspect Phase. Most electrical equipment should

have been inspected by the end of the underway period. The INSURV Inspector and Ship's Force will establish the list of equipment to be inspected during the open and inspect phase. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the Inspector's return at 0800 the day following the underway period. The significance of being completely ready at this time cannot be overemphasized. The following is a list of systems or components which may be inspected during this phase. Equipment may be added or deleted from the list as performance dictates. Wherever possible, items should be brought forward from the open and inspect phase to the underway phase.

a. Complete ship service motor generator over-speed test. (If not conducted earlier).

b. Inspect DC motors and controllers not inspected underway. (Tagout required).

c. Complete SSTGs collector and cable connection box visual inspections.

d. Lube oil pumps and controllers. (Tagout required) (Class dependent):

(1) Propulsion lube oil pumps.

(2) Stripping pumps.

(3) Propulsion lube oil pumps.

(4) Control oil pumps.

e. Emergency lighting systems. This inspection is performed in conjunction with the Main Propulsion Inspector's entry into the Reactor Compartment.

3-6. Special Procedures.

a. Modes of Propulsion. To obtain the necessary coordination (Including requesting bells, requesting information and informing the OOD when operations are complete) for EPM and SPM demonstrations, sound powered telephone communication is required between Control/Maneuvering/EPM and SPM control panels. During manual clutch operation, proper operation of the clutch control oil accumulator/annular spring assembly (If applicable) should be demonstrated. This will require proper air/nitrogen pre-charging of the accumulator. This should be verified before this event starts.

b. EPM Testing. While operating underway submerged, demonstrate the ability to shift modes of propulsion and demonstrate clutch operation using the following guidance and the ship's operating procedures. During the clutch operation perform

the following evolutions:

(1) SSN 21 class, SSN 688 class and SSBN 726 class.

(a) Engage the clutch manually at the maximum designed differential rpm.

(b) Run the EPM at maximum astern speed for approximately two minutes. (Put no stern way on the ship)

(c) Run the EPM at maximum ahead speed for at least two minutes.

(d) Disengage the clutch in power.

c. SPM Testing. The SPM shall be tested by lowering, remote training and run testing, local power training (if applicable), running for a minimum of 2 minutes while trained to 000 degrees relative and 180 degrees relative, local hand training, and hand and normal hoisting of the SPM. (As applicable to ship class.)

3-7. Electrical Equipment Resistance Readings. The electrical equipment resistance to ground data sheet, Table 3-1, is required to be completed within ninety days prior to the start of the inspection. The completed data sheet should be placed in the EL inspection area package and presented to the Inspector upon arrival. Readings should be taken before and after cleaning and recorded where applicable.

3-8. Motor Data Information. The Motor Data Information in Table 3-2 is required to be filled out prior to the inspection and should be placed in the EL inspection package and presented to the Electrical Inspector upon arrival.

3-9. Detroit Pressure Switch Readings. Detroit pressure switches in tables 3-5, 3-6, or 3-7 are required to be tested within one month prior to the start of the inspection. The recorded readings must be the first measured actuating pressure values obtained prior to making any adjustments. The completed data table should be placed in the EL inspection package and presented to the Electrical Inspector upon his arrival.

Table 3-1
RESISTANCE READING

Component	Boost		Buck		DC Combined		AC Stator		AC Field	
	Before/After	Spec	Before/After	Spec	Before/After	Spec	Before/After	Spec	Before/After	Spec
NR 1 SSMG										
NR 2 SSMG										
NR 1 43KW										
NR 2 43KW										
NR 1 70KW										
NR 2 70KW										
NR 3 70KW										
NR1 70KW SWS										
NR 2 70 KW SWS										
NR 1 10KW										
NR 2 10KW										

Component	Stator		Rotor	
	Before/After	Spec	Before/After	Spec
NR 1 SSTG				
NR 2 SSTG				
Diesel Generator				
Trim Pump				
Trim Pump NR 2				
Drain Pump				
Drain Pump NR 2				
DC MLO/PLO				
DC MLO/PLO Stripping				

Component	Field	Spec	Armature	Spec
EPM				

Component	Grounds	Spec		
Battery				
DC Bus				
Lighting Fwd				
Lighting Aft				
Circuit JA				
Circuit 2JV				

Table 3-2
MOTOR SPECIFICATION DATA SHEET

Instructions:

a. Data table is to be completed by Ship's Force and results provided to the Chief Electrical Inspector ASAP to support the inspection.

b. Use applicable MRC cards for the references.

c. List the clearance values as they appear in the MRC card or Tech Manual you reference.

	Brush Box Height			Brush Spring Tension (for NON-constant tension type springs)			Brush Length		
Equipment	Minimum	Maximum	Reference (PMS MRC)	Minimum	Maximum	Reference (PMS MRC)	Minimum	Maximum	Reference (PMS MRC)
400 Hz 10KW MG									
Overspeed Trip Device				n/a	n/a	n/a			
400 Hz 43KW MG									
Overspeed Trip Device				n/a	n/a	n/a			
400 Hz 70KW MG									
Overspeed Trip Device				n/a	n/a	n/a			
400 Hz 70KW SWS MG									
DG Slip Rings									
Drain Pump									
Drain Priming Pump									
MLO Pump (DC)									
PLO Pump (DC)									
PLO Stripping Pump (DC)									
SSMG Commutator									
SSMG Slip Ring									
Overspeed Trip Device				n/a	n/a	n/a			
SSTG Slip Ring									
Trim Pump									
Trim Priming Pump									
EPM									
Overspeed Trip Device				n/a	n/a	n/a			

Table 3-3
EPM UNDERWAY TEST DATA TABLE

Time/Condition	DC Bus Voltage	Field Amps	Volts	Armature Amps	Blower Amps
AS Max Turns Initial					
AS Max Turns @ 2 Minutes					
AD Max Turns Initial					
AD Max Turns @ 2 Min					
Maximum					
Normal					
Minimum					

Table 3-4

SPM UNDERWAY TEST DATA TABLE

Condition	Amps
Max Surge on Startup Expect >800 Amps	
Steady State Expect ~460 Amps	

Table 3-5
SSBN 726 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
Propulsion Lube Oil (PLO)					
PLO-74-PS-21	Fast Speed Auto Start Standby PLO Service Pump From Turbine Bearings Low Pressure				
PLO-74-PS-22	Fast Speed Propulsion Turbine Forward Bearings Low Pressure Alarm				
PLO-74-PS-23	Slow Speed Propulsion Turbine Forward Bearings Low Pressure Alarm				
PLO-74-PS-24	Slow Speed Auto Start Standby PLO Service Pump From Forward Turbine Bearings Low Pressure				
PLO-75-PS-30	Control Oil Header Low Pressure Alarm				
PLO-77-PS-09	Slow Speed Auto Start Standby PLO Service Pump NR 2 From Pump Discharge Low Pressure				
PLO-77-PS-10	Slow Speed Auto Start Standby PLO Service Pump NR 1 From Pump Discharge Low Pressure				
PLO-77-PS-11	Fast Speed Auto Start Standby PLO Service Pump NR 2 From Pump Discharge Low Pressure				
PLO-77-PS-12	Fast Speed Auto Start Standby PLO Service Pump NR 1 From Pump Discharge Low Pressure				
PLO-78-PS-02	Slow Speed Auto Start Standby PLO service pump from Main Thrust Bearing Low Pressure				
PLO-78-PS-03	Slow Speed Main Thrust Bearing Low Pressure Alarm				
PLO-78-PS-04	Fast Speed Auto Start Standby PLO Service Pump From Main Thrust Bearing Low Pressure				
Turbine Generator Lube Oil (TGLO)					
LOG-74-PS-09	Auto Start Standby Pump NR 3 From Pump NR 1 Low Discharge Pressure				
LOG-74-PS-10	Auto Start Standby Pump NR 4 From Pump NR 2 Low				

Table 3-5
SSBN 726 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
	Discharge Pressure				
LOG-74-PS-21	Auto Start Coastdown Pump NR 1 From Low Oil Pressure				
LOG-74-PS-22	Auto Start Coastdown Pump NR 2 From Low Oil Pressure				
LOG-74-PS-33	SSTG NR 1 Generator End Low Pressure Alarm				
LOG-74-PS-34	SSTG NR 2 Generator End Low Pressure Alarm				
LOG-74-PS-46	Auto Start Standby Pump NR 2 From Bearing Low Pressure				
LOG-74-PS-47	Auto Start Standby Pump NR 3 From Bearing Low Pressure				
LOG-74-PS-48	Auto Start Standby Pump NR 4 From Bearing Low Pressure				
LOG-74-PS-15	Auto Start Standby Pump NR 1 From Pump NR 3 Low Discharge Pressure				
LOG-74-PS-16	Auto Start Standby Pump NR 2 From Pump NR 4 Low D/C Press.				
LOG-74-PS-49	SSTG NR 1 Turbine End Low Pressure Alarm				
LOG-74-PS-50	SSTG NR 2 Turbine End Low Pressure Alarm				
LP Blower					
ABT-43-PS-09	NR 1 Blower Suction Shutdown				
ABT-43-XS-07	NR 1 Blower Differential Pressure				
ABT-43-PS-03	NR 1 Blower Lube Oil Pressure				
ABT-78-PS-09	NR 2 Blower Suction Shutdown				
ABT-78-XS-07	NR 2 Blower Differential Pressure				

Table 3-5
SSBN 726 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
ABT-78-PS-03	NR 2 Blower Lube Oil Pressure				
Diesel					
DA-45-PS-06	Scavenging Air Blower High Blower Back Pressure				
DA-45-PS-07	Scavenging Air Blower High Blower Back Pressure				
DA-45-PS-04	High Vacuum Cutout No1				
DA-45-PS-05	High Vacuum Cutout No2				
DA-45-PS-06	Low RPM Shutdown No1				
DA-45-PS-07	Low RPM Shutdown No2				
	Over Speed Governor Trip				
	Back Pressure Interlock				
AHP-70-PS-21	HPAC NR 2 High Air Pressure Cutout (PS 1)				
AHP-70-PS-24	HPAC NR 3 High Air Pressure Cutout (PS 1)				
	HPAC NR 1 Low Oil Pressure Cutout (PS 2)				
	HPAC NR 2 Low Oil Pressure Cutout (PS 2)				
	HPAC NR 3 Low Oil Pressure Cutout (PS 2)				
High Pressure Air Dryer					
	HPAD NR 1 Indicator Temperature Controller				
	HPAD NR 1 High Dryer Temperature Shutdown				
PS-1	HPAD NR 1 LH Tower Pres/Htr interface				
PS-2	HPAD NR 1 RH Tower Pressure/Heater Interface				
PS-3	HPAD NR 1 Purge Air Flow				
	HPAD NR 2 Indicator Temperature Controller				
	HPAD NR 2 High Dryer				

Table 3-5
SSBN 726 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
	Temperature Shutdown				
PS-1	HPAD NR 2 LH Tower Pressure/Heater Interface				
PS-2	HPAD NR 2 RH Tower Pressure/Heater Interface				
PS-3	HPAD NR 2 Purge Air Flow				
R12 Systems					
RSS-430-PS-5	NR 1 High Pressure Shutdown				
RSS-430-PS-1	NR 1 Low Pressure Shutdown				
RSS-430-XS-3	NR 1 Oil Failure Shutdown				
RSS-430-XS-7	NR 1 Water Failure Shutdow				
RSS-430-PS-6	NR 2 High Pressure Shutdown				
RSS-430-PS-2	NR 2 Low Pressure Shutdown				
RSS-430-XS-4	NR 2 Oil Failure Shutdown				
RSS-430-XS-8	NR 2 Water Failure Shutdown				
Propulsion Lube Oil (PLO)					
PLO-61-PS-15	Auto Start Standby PLO Service Pump NR 2 From Low Pump NR 1 Pressure				
PLO-61-PS-16	Auto Start Standby PLO Service Pump NR 1 From Low Service Pump NR 2 Pressure				
PLO-61-PS-17	Auto Start Standby PLO Service Pump NR 2 From Low Pump NR 1 Pressure				
PLO-61-PS-18	Auto Start Standby PLO Service Pump NR 1 From Low Service Pump NR 2 Pressure				
PLO-63-PS-19	Forward Turbine Bearings Low Pressure Alarm				
PLO-63-PS-21	Auto Start Standby PLO Pump on Low Turbine Forward Journal Bearing Pressure				
PLO-63-PS-	Auto Start Standby PLO Pump				

Table 3-5
SSBN 726 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
22	on Low Turbine Forward Journal Bearing Pressure				
PLO-63-DPS-23	NR 1 ME PLO Auto Switch (Slow to Fast) on Shaft Speed				
PLO-63-DPS-24	NR 2 ME PLO Auto Switch (Slow to Fast) on Shaft Speed				
PLO-62-PS-25	Main Thrust bearing Low Pressure Alarm				
PLO-62-PS-27	Auto Start Standby PLO Pump on Low Main Thrust Bearing Pressure				
PLO-62-PS-28	Auto Start Standby PLO Pump on Low Main Thrust Bearing Pressure				

Table 3-6
SSN 21 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
Turbine Generator Lube Oil (TGLO)					
LOG-61-PS-11	Auto Start Standby SSTG Set Lube Oil Service Pump NR 3 on Low Pressure				
LOG-61-PS-12	Auto Start Standby SSTG Set Lube Oil Service Pump NR 4 on Low Pressure				
LOG-61-PS-19	Auto Start Standby SSTG Set Lube Oil Service Pump NR 1 on Low Pressure				
LOG-61-PS-20	Auto Start Standby SSTG Set Lube Oil Service Pump NR 2 on Low Pressure				
LOG-62-PS-33	Auto Start SSTG Set Air-Motor-Driven Coastdown Pump NR 1 on Low Pressure				
LOG-62-PS-34	Auto Start SSTG Set Air-Motor-Driven Coastdown Pump NR 2 on Low Pressure				
LOG-62-PS-39	Auto Start Standby SSTG Set Lube Oil Service Pump NR 1 on Low Pressure				
LOG-62-PS-40	Auto Start Standby SSTG Set Lube Oil Service Pump NR 2 on Low Pressure				
LOG-62-PS-41	Auto Start Standby SSTG Set Lube Oil Service Pump NR 3 on Low Pressure				
LOG-62-PS-42	Auto Start Standby SSTG Set Lube Oil Service Pump NR 4 on Low Pressure				
LOG-62-PS-43	NR 1 SSTG Turbine End Low Lube Oil Pressure Alarm				
LOG-62-PS-44	NR 2 SSTG Turbine End Low Lube Oil Pressure Alarm				
LOG-62-PS-45	NR 1 SSTG Exciter End Low Lube Oil Pressure Alarm				
LOG-62-PS-46	NR 1 SSTG Exciter End Low Lube Oil Pressure Alarm				
LOG-63-PS-75	SSTG NR 1 Governor Signal Set Reference Speed Reset				

Table 3-6
SSN 21 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
LOG-63-PS-76	SSTG NR 2 Governor Signal Set Reference Speed Reset				
LOG-63-PS-77	NR 1 SSTG Governor Signal Trip Indicator on Loss of Oil Pressure				
LOG-63-PS-78	NR 2 SSTG Governor Signal Trip Indicator on Loss of Oil Pressure				
LOG-62-PS-81	NR 1 SSTG Reducing Valve Primary Diaphragm Failure Alarm				
LOG-62-PS-82	NR 2 SSTG Reducing Valve Primary Diaphragm Failure Alarm				
LOG-62-PS-85	NR 1 SSTG Bearing Header Low Pressure Throttle Trip				
LOG-62-PS-86	NR 2 SSTG Bearing Header Low Pressure Throttle Trip				
LP Blower					
ABT-757-PS-007	Low Pressure Blower Interlock				
ABT-504-PS-2	Suction Shutdown				
ABT-504-PS-3	Differential Pressure				
ABT-504-PS-4	Lube Oil Pressure				
Diesel					
DLO-757-PS-013	DLO Low Pressure Alarm				
n/a	DLO High Temperature Alarm				
DA-756-PS-003	High Backpressure Switch NR 1				
DA-756-PS-004	High Backpressure Switch NR 1 (alt)				
DA-756-PS-12	High Backpressure Switch NR 2				
DA-757-PS-005	Compartment Vacuum Shutdown NR 1				
DA-757-PS-006	Compartment Vacuum Shutdown NR 2				
	Low RPM Shutdown				
	Over Speed Trip				

Table 3-6
SSN 21 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
High Pressure Air Compressor					
	HPAC NR 1 High Air Pressure Cutout				
	HPAC NR 2 High Air Pressure Cutout				
	HPAC NR 1 Low Oil Pressure Cutout				
	HPAC NR 2 Low Oil Pressure Cutout				
High Pressure Air Dryer					
	Indicator Temperature Controller				
	High Dryer Temperature Shutdown				
	LH Tower Pressure/Heater Interface				
	RH Tower Pressure/Heater Interface				
	Purge Air Flow				
R12 Systems					
	NR 1 High Pressure Cutout				
RSS-711-PS-005	NR 1 Low Pressure Cutout				
RSS-711-PS-001	NR 1 Oil Failure Cutout				
RSS-711-DP-003	NR 1 Oil Cooler Temperature Switch				
RSS-711-TS-043	NR 1 Chill Water Failure Shutdown				
RSS-711-DP-007	NR 2 High Pressure Cutout				
RSS-711-PS-006	NR 2 Low Pressure Cutout				
RSS-711-PS-002	NR 2 Oil Failure Cutout				
RSS-711-DP-004	NR 2 Oil Cooler Temperature Switch				
RSS-711-TS-044	NR 2 Chill Water Failure Shutdown				
RSS-711-DP-008					

Table 3-7
SSN 688 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
Propulsion Lube Oil (PLO)					
PLO-61-PS-35	Auto Start Standby PLO Service Pump NR 2 From Low Pump NR 1 Pressure				
PLO-61-PS-36	Auto Start Standby PLO Service Pump NR 1 From Low Service Pump NR 2 Pressure				
PLO-62-PS-37	Auto Start Standby PLO Service Pump NR 2 From Low Main Thrust Bearing Pressure				
PLO-62-PS-38	Auto Start Standby PLO Service Pump NR 1 From Low Main Thrust Bearing Pressure				
PLO-63-PS-39	Auto Start Standby PLO Service Pump NR 2 From Low Propulsion Turbine Supply Pressure				
PLO-63-PS-40	Auto Start Standby PLO Service Pump NR 1 From Low Propulsion Turbine Supply Pressure				
PLO-63-PS-41	Propulsion Turbine Supply Low Pressure Alarm				
PLO-62-PS-42	Main Thrust Bearing Low Pressure Alarm				
Turbine Generator Lube Oil (TGLO)					
LOG-61-PS-001	Auto Start Standby TGLO Pump NR 3 From Discharge Piping Low Pressure				
LOG-61-PS-002	Auto Start Standby TGLO Pump NR 4 From Discharge Piping Low Pressure				
LOG-61-PS-003	Auto Start Standby TGLO Pump NR 1 From Discharge Piping Low Pressure				
LOG-61-PS-004	Auto Start Standby TGLO Pump NR 2 From Discharge Piping Low Pressure				
LOG-61-PS-005	Auto Start Emergency Coastdown Pump NR 1 From Cooler Outlet Piping Low Pressure				

Table 3-7
SSN 688 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
LOG-61-PS-006	Auto Start Emergency Coastdown Pump NR 2 From Cooler Outlet Piping Low Pressure				
LOG-61-PS-007	Auto Start Standby TGLO Pump NR 1 From SSTG HP Bearing Low Pressure				
LOG-61-PS-009	Auto Start Standby TGLO Pump NR 3 From SSTG HP Bearing Low Pressure				
LOG-61-PS-010	Auto Start Standby TGLO Pump NR 4 From SSTG HP Bearing Low Pressure				
LOG-61-PS-011	SSTG NR 1 HP Bearing Low Pressure Alarm				
LOG-61-PS-012	SSTG NR 2 HP Bearing Low Pressure Alarm				
LOG-61-PS-013	SSTG NR 1 Generator Bearing NR 2 Low Pressure Alarm				
LOG-61-PS-014	SSTG NR 2 Generator Bearing NR 2 Low Pressure				
LP Blower					
ABT-504-PS-2	Suction Shutdown				
ABT-504-PS-3	Differential Pressure				
ABT-504-PS-4	Lube Oil Pressure				
Diesel					
DA-706-PS-03	Snorkel Safety Back Pressure NR 1				
DA-706-PS-13	Snorkel Safety Back Pressure NR 2				
DA-707-PS-04	Snorkel Safety High Vacuum Cutout NR 1				
DA-707-PS-12	Snorkel Safety High Vacuum Cutout NR 2				
	Low RPM Shutdown				
	Over Speed Trip				
DE-503-PS-1	Compartment Back Pressure Interlock NR 1				
High Pressure Air Compressor					
AHP-61-PS-1	HPAC NR 1 High Air Pressure Cutout				

Table 3-7
SSN 688 CLASS DETROIT PRESSURE SWITCH DATA

Switch	Function	Open (psig)		Close (psig)	
		Actual	Spec (min/max)	Actual	Spec (min/max)
Note: Record the FIRST measured actuating pressure value, BEFORE ANY ADJUSTMENTS ARE MADE to the pressure switch.					
AHP-61-PS-2	HPAC NR 2 High Air Pressure Cutout				
AHP-62-PS-35	HPAC NR 1 Low Oil Pressure Cutout				
AHP-62-PS-36	HPAC NR 2 Low Oil Pressure Cutout				
High Pressure Air Dryer					
	Indicator Temperature Controller				
	High Dryer Temperature Shutdown				
PS-1	LH Tower Pressure/Heater Interface				
PS-2	RH Tower Pressure/Heater Interface				
PS-3	Purge Air Flow				
R12 Systems					
RSS-707-PS-5	NR 1 High Pressure Shutdown				
RSS-707-PS-1	NR 1 Low Pressure Shutdown				
RSS-707-PS-3	NR 1 Oil Failure Shutdown				
RSS-707-PS-7	NR 1 Water Failure Shutdown				
RSS-707-PS-6	NR 2 High Pressure Shutdown				

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CHAPTER FOUR
MAIN PROPULSION/REACTORS GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

4-1. Preparations.

Upon arrival, provide the Inspector a package tailored to the Main Propulsion (MP) and Reactor (RX) inspection areas containing the information listed in Chapter 1, Section 7 and the items below:

(1) A copy of the Material and Cleanliness, Preservation and Stowage Section from the most recent Operational Reactor Safeguards Examination (ORSE) Report.

(2) Completed Bearing Data Sheets (Table 4-1 and Table 4-2). Contact the MP inspector prior to the inspection for specific guidance regarding this data.

(3) PMT Data (determined within three months of the inspection) on:

(a) ASW valve leak checks.
(b) ASW pump performance, as applicable.
(c) HP brine pump performance, as applicable.
(d) MSW valve leak checks.
(e) MSW/ASW valve hydraulic operating pressures.

(4) Ship’s Force Work Lists for paint/preservation, leaking steam/water valves, and lagging repair (if not tracked in the CSMP).

(5) EM01, RC01, and RL01 CSMPs.

(6) Copies of previous three years of Liaison Action Requests (LAR).

4-2. Inspection Routine.

Background:

a. The inspection is material oriented and normally consists of two phases: underway phase, and open and inspect phase. Upon completion of the inspection, the findings are debriefed. The duration of the inspection is usually four days.

b. PMS Maintenance Requirement Cards are the primary references for equipment inspection. NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines are also used.

4-3. Underway Phase. During the underway phase equipment is checked to design specifications in an operating environment. The

underway phase starts on the afternoon of the first day and is normally complete by the morning of the third day. The underway phase is comprised of an outbound surface transit, a submerged period, a test depth period, and an inbound surface transit. INSURVINST 4730.2D Submerged testing will include capacity checks of the evaporator and vapor distilling plant, cycling all hull and backup valves at test depth with flood control, maximum ahead power run and an operational check of the vibration reducer. Additional testing to be conducted will be discussed in detail by the Main Propulsion Inspector at the in-brief.

4-4. Open and Inspect Phase. The INSURV Inspector and Ship's Force will establish the list of equipment to be inspected during the open and inspect phase. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the Inspector's return at 0800 following the underway period. The significance of being completely ready at this time cannot be over emphasized. Inspection items should be front loaded as much as possible to complete all inspections in a timely manner. The following is a list of systems or components which will be inspected during this phase. Equipment will be added or deleted from the list based on at sea evaluation.

a. The Reactor Compartment.

b. TGLO Standby feature checks (including coastdown pump operation).

c. PLO standby feature checks.

d. Reduction gear inspection (annual inspection including observing spray nozzle operation).

e. MS-3 and MS-4 overpressure trip PMS.

f. Seawater side of a condenser or seawater heat exchanger (based on at sea evaluation).

g. Test the inflatable shaft seal (if applicable).

h. MS-3 and MS-4 drift checks.

4-5. Specific Testing Information.

Astern Reversal (Surfaced)

a. Shaft reversal astern will be conducted at the conclusion of the maximum ahead power run (Surfaced). The ship should be operated at maximum allowed surfaced speed. Reactor coolant pumps will be operated in fast speed with two main feed pumps before ordering "All Back Emergency."

b. Initiate the astern reversal from the maximum ahead surfaced propulsion limit by ordering "All Back Emergency." Answer the maximum allowed astern rpm. Record data.

c. Shaft rpm is to be lowered to the rpm specified for "All Back Full" within five minutes of exceeding this rpm in the astern direction while answering "All Back Emergency." Run at "All Back Full" for about ten minutes. During this period, astern steering gear testing will also be conducted by the auxiliaries inspector. Answer "All Back Two-Thirds" following steering gear testing. This test is normally immediately followed by the ahead reversal (surfaced).

4-6. Ahead Reversal (Surfaced). The ahead reversal is conducted by ordering "All Ahead Full" from "All Back Two-Thirds."

4-7. Maximum Ahead Power Run (Submerged). Initiate the test by ordering All Ahead Full and increasing speed in 5 RPM increments while using maximum safe rudder motion to All Ahead Flank. The speed increase in 5 rpm increments with the rudder motion is required by NSTM chapter 231 for observing main engine journal bearing temperatures. Run at maximum speed for one hour. Record data as specified in NSTM chapter 231.

4-8. Evaporator/Vapor Distilling Plant Testing.

a. The evaporator will be operated during the high speed run and the steep angle and deep dive operations as an exception to Rig for Deep Submergence with the permission of the Commanding Officer.

b. Each plant will be operated at full capacity as specified by PMS to conduct a capacity check. The level of the tank being filled is to be recorded in the remarks section of the operator's logs at no less than hourly intervals.

4-9. Vibration Reducer Operational Check. Proceed from 150 feet to one half test depth with a seven degree down angle at "All Ahead Two-Thirds." Then return to 150 feet with a seven degree up angle at "All Ahead Two-Thirds."

4-10. Data Sheets. The Bearing Data Sheets for the propulsion train (Table 4-1 and 4-2) should be completed within one month prior to the inspection and placed in the MP inspection area package. (Note: Tables are referenced to 688 class submarines. Adjust as required for ship specific requirements.)

4-11. RTE Bearing Setpoints. RTE bearing setpoints will be checked for all main engine, reduction gear, and SSTG bearings. NSTM chapter 231 explains the procedure in detail. This section must be reviewed prior to the inspection in order for this testing to be completed efficiently and correctly.

Table 4-1
JOURNAL BEARING DATA

EQUIPMENT	BEARING	JOURNAL BEARING CONSTANT	DEPTH MICROMETER READING	CLEARANCE (1)	REFERENCE PMS MRC	BEARING ROLL OUT CRITERIA
PROPULSION TURBINE	PORT FWD			(2)	(4)	(7)
	PORT AFT			(2)	(4)	(7)
	STBD FWD			(2)	(4)	(7)
	STBD AFT			(2)	(4)	(7)
Note: Vibration Reducer Journal Bearing measurements are covered by NM-019 Series.						
SSTG PORT	GENERATOR			(3)	(5)	(8)
	MIDDLE (LP)				(6)	(9)
	AFT (HP)				(6)	(10)
SSTG STARBOARD	GENERATOR			(3)	(5)	(8)
	MIDDLE (LP)				(6)	(9)
	AFT (HP)				(6)	(10)

Ref: (a) Main Propulsion Turbine Technical Manual NAVSEA S9231-AH-MMA-010
(b) SSTG Set Technical Manual NAVSEA S9311-AC-MMA-010/(C)

(1) Clearance refers to the measurement between the bearing itself and the bearing casing, i.e., the journal diameter and the bearing housing diameter. This requires disassembly of the bearing to measure if the data is unavailable. Not demanded during an inspection unless other abnormalities occur, though ship's force should be made aware of the requirement to maintain records. Note that some boats interpret this column to be the difference between the Depth Micrometer Reading and the Journal Bearing Constant; while this is acceptable, ship's force should be made aware of the distinction between the two, as well as the need to maintain records. [Data required to be maintained by the Joint Maintenance Manual CINCLANTFLT/CINCPACFLT 4790.3 Series VOL IV PART III CHAP 10 SECTION 10.3.j.]

(2) Allowable clearance range is 0.014-0.017" per ref (a) Figure 6-34.

(3) Allowable clearance is 0.016" for the pad type bearing or 0.021 inch for the journal type bearing per NM-006 A-2. [If no data is given here, check the PMS schedule to determine if the item was marked as completed.] (The generator bearing portion of the PMS is being deleted per TFBR; the POC is Brian Garza at NAVSEA 92T235 703-602-7080 X421.)

(4) NM-004 A-10R

(5) NM-006 A-2 (The generator bearing portion of the PMS is being deleted per TFBR; the POC is Brian Garza at NAVSEA 92T235 703-602-7080 X421.)

(6) NM-006 A-2 and ref (b) Table 4-2 and Section 4-3.4.2.3

(7) Criteria: 0.007” per NM-004 A-2 and ref (a) Chapter 2, Section 2-6-1-1 and Figure 6-34

(8) Criteria: 0.004” regardless of the type of bearing, per NM-006 A-2. [Note that this measurement is not taken directly. Instead the clearance is measured per PMS. The change in the clearance from the initial reading during new installation to that currently measured by PMS gives the rollout measurement.] (The generator bearing portion of the PMS is being deleted per TFBR; the POC is Brian Garza at NAVSEA 92T235 703-602-7080 X421.)

(9) Criteria: 0.006” per NM-006 A-2 and ref (b).

(10) Criteria: 0.005” per NM-006 A-2 and ref (b).

Table 4-2
THRUST BEARING/NOZZLE CLEARANCE DATA

EQUIPMENT		MINIMUM LIMIT	MAXIMUM LIMIT	MAXIMUM WEAR	REFERENCE PMS MRC/ TECHNICAL MANUAL
PROPULSION TURBINE THRUST BEARING	PORT	(1)	(1)	(4)	(6)
	STARBOARD	(1)	(1)	(4)	(6)
PROPULSION TURBINE NOZZLE CLEARANCE	PORT	(2)	(2)		(7)
	STARBOARD	(2)	(2)		(7)
SSTG THRUST BEARING	PORT	(3)	(3)	(5)	(8)
	STARBOARD	(3)	(3)	(5)	(8)

Ref: (a) Main Propulsion Turbine Technical Manual NAVSEA S9231-AH-MMA-010
(b) SSTG Set Technical Manual NAVSEA S9311-AC-MMA-010/(C)
(c) Steam and Electric Plant Manual CP 103

(1) Allowable limits are 0.010-0.014” per NM-004 48M-1

(2) Nozzle clearance limits are 0.130-0.150” per ref (a) Figure 6-34. Note this is the K1 reading called for in the figure and usually recorded in a table on the figure. Information regarding the procedure for taking the measurement is in ref (a) Section 2-14.

(3) Allowable limits are 0.013-0.017” [0.014-0.028” for Tridents] per NM-006 48M-1

(4) Criteria: 0.020” per NM-004 48M-1 and ref (a) Section 2-7

(5) Criteria: 0.023” [0.028” for Trident] per NM-006 48M-1

(6) NM-004 48M-1 and ref (a) Figure 6-34 [N/A for Tridents]

(7) Ref (a) Section 2-14 and Figure 6-34

(8) NM-006 48M-1

Reference (b) has in-depth information and explanations of the above. Reference (c) has bearing limits applicable following a casualty.

CHAPTER FIVE
OPERATIONS GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

5-1. Preparations.

a. On arrival, provide the Inspector a package tailored to the Operations (OP) inspection area containing the information listed in Chapter 1, Section 7, and the items below:

(1) Completed test equipment data sheet (Table 5-1).

(2) Communication plan.

(3) A list of commercial equipment installed, with copies of authorizing SHIPALT/A&I instructions attached.

b. The below listed documents will be reviewed during the course of the inspection:

(1) EMI/RFI surveys.

(2) Ship's Portable Electrical/Electronic Test Equipment Requirements List (SPETERL).

(3) Most recent System Readiness Test (SRT) and SHROUD test of RDF equipment.

(4) Any other Operations Department electronic groom reports or surveys.

(5) Most recent mast and antenna inspection report.

(6) SIB pictorial of mast and antenna arrangement.

5-2. Materials.

a. In determining electronic equipment operability, PMS cards may be used by the inspector or his assistant. The ship should review electronic equipment PMS requirements and verify all required test equipment is onboard and in working order.

5-3. General Information.

a. Evolutions requiring special coordination include:

(1) Demonstration of ship’s ability to communicate via all radio circuits using all possible equipment line-ups.

(2) Weapons data link demonstrations, both HF and UHF. (Will require coordination with the controlling ISIC or TYCOM as appropriate.)

(3) RDF, ESM, IFF, and communication systems evaluation

should be accomplished with the cognizant Shipboard Electronics System Evaluation Facility (SESEF) or Fleet Technical Support Center, where available, and will require scheduling by the ship.

(4) Special communications at sea demonstration will require scheduling by COMNAVTELCOM as requested by the ship. Ensure a transmit window while at Periscope depth (first at-sea day) is approved.

b. Have crypto loaded for all communication circuits and IFF prior to the board's arrival.

c. Liaison with SESEF in advance of the inspection for additional Comm/IFF/LINK-11 demonstrations as necessary. SESEF information is provided as follows:

SESEF	TELEPHONE	UHF GUARD	HF GUARD	HOURS
Norfolk "SESEF"	(804) 425-1094 DSN 927-9624	274.8 MHz clear	7535 kHz (USB windows)	0700-1630
San Diego "Reliable Partner"	(619) 553-3184 DSN 933-3184	236.2 MHz 264.2 MHz clear	2792 kHz 6487 kHz (USB windows)	0800-1600
Puget Sound "Magic Carpet Sierra"	(206) 457-5658 (Site) DSN 744-7024(SY) (206) 396-2423(SY)	308.5 MHz clear	3236 kHz (USB windows)	Must schedule
Hawaii "Patrol Leader Bravo"	(808) 735-3715 (Site) (808) 668-3210(SY)	277.0 MHz clear		Must schedule

d. Liaison with squadron in advance of the inspection to have sail staging installed as soon as possible (NOT the morning of the Open and Inspect day) upon the ship's return to port and for the LINK-11 demonstration of both the UHF and HF modes during the outbound or inbound transits.

e. The sail inspection will commence promptly at 0800 on the Open and Inspect day.

5-4. Inspection Routine.

a. The inspection is material oriented and normally consists of two phases: the underway phase, and open and inspect phase. Upon completion of the inspection, the findings are debriefed. The duration of the inspection is usually four days.

b. PMS Maintenance Requirement Cards are the primary

references for equipment inspection. NAVSEA Building Specifications, NAVSEA technical manuals, equipment technical manuals, Type Commander's directives and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines are also used.

5-5. Underway Phase. During the underway phase equipment is checked to design specifications in an operating environment. The underway phase usually starts the afternoon of the first day and is complete by the morning of the third day. The underway phase is comprised of an outbound surface transit, a submerged period, a test depth period, a second submerged period (If required) and an inbound surface transit. Some of the demonstrations that are conducted during this phase include testing portable communications equipment including all bridge to bridge radio sets.

a. Outbound Surface Transit Period.

(1) IFF testing using all modes and antennas with SESEF or support platform with Mode 4 interrogator.

(2) Communication checks.

(3) Weapons data links in all modes to include OTCIXS, OTH targeting and LINK-11, both HF and UHF.

(4) ESM capabilities including periscope electronics.

(5) RDF/DF systems using known beacons or targets of opportunity.

b. Submerged Periods.

(1) PMS checks on emergency communications equipment (usually while at test depth).

(2) Continue ESM testing.

(3) At periscope depth conduct mast timing and periscope torque checks. Clear broadcast prior to departing periscope depth. (NOTE: This should be scheduled during a daylight periscope depth period.)

(4) Conduct SPECOMM testing. (Ensure testing window is scheduled to open prior to first PD period and remain open throughout underway period.)

(5) Towed buoy antenna demonstrations to include VLF, HF, and navigation signal reception. (Tridents only)

(6) For ELF capable ships, conduct floating wire demonstration to include HF, VLF, ELF and navigation signal reception.

c. Inbound Surface Transit/Operations.

(1) Continue any unsuccessful communication circuit demonstrations.

(2) Post submergence antenna resistance measurements.

(3) Test ship's whistle.

(4) Place masts and antennas in the under-ice positions (if applicable).

5-6. Open and Inspect Phase. The INSURV Inspector will establish the list of equipment to be inspected during the open and inspect phase. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the Inspector's return at 0800 following the underway period. The significance of being completely ready at this time cannot be over-emphasized. The following is a list of systems or components which may be inspected during this phase. Equipment may be added or deleted from the list as performance dictates.

a. Sail inspection. (Racetrack and tagout must be completed prior to 0800)

b. Conduct remaining electronics and communications equipment PMS checks.

c. Towed buoy antenna cradle door operation and visual inspection (Tridents).

d. IMF perform RF sweep of Type-18 periscope if not already completed prior to inspection start. (SSN)

e. IMF Perform EMSORT Type-15/Type-8 periscopes if not already completed prior to inspection start. (Trident)

5-7. Special Procedures. Although ship's operating procedures and PMS cards are usually the primary guides for evaluating equipment performance, INSURV has developed the following procedures for circumstances where the operating procedure or PMS does not address the testing desired.

IFF Testing. Testing will be performed actively using SESEF or Squadron arranged asset. Testing of IFF Modes 1, 2, 3 and 4 may be conducted using an AN/APM-424 test set if no other means is available.

5-8. AN/BRD-7 Shroud Test. This test requires FTSC assistance. The shroud test should be performed prior to the start of the inspection (within the last two weeks). FTSC will follow their own test procedure. Results will then be reported to INSURV.

Table 5-1
GENERAL PURPOSE ELECTRONIC TEST EQUIPMENT

1. The GPETE data sheet (Table 5-1) is required to be completed within two weeks prior to the inspection. The completed data sheet is to be placed in the OP inspection area package and presented to the inspector upon his arrival.

2. In order to determine if the status of the ship's GPETE allowance is adequate to support the preventive and corrective maintenance programs, it is requested that the following information be provided to the OP Inspector upon his arrival. This is for all test equipment on the ship.

3. Inventory status:

a. Allowance total (From SPETERL). _____

b. Number of SPETERL required items held on ship's inventory (Do not include not-on-allowance items). _____

c. Number of SPETERL required items not held on ship's inventory (2a - 2b). _____

4. Calibration status of quantity listed in 2b above.

a. Total within calibration and operational. _____

b. Total overdue for calibration (Include items at calibration facility). _____

c. Total non-operational or out of calibration (Include items at repair facility). _____

5. SPETERL.

a. Date of current SPETERL.

b. Equipment on board but not reflected in current SPETERL. _____

6. Comments on any calibration and/or equipment support problems that may exist or pose a particular problem to the ship are welcome. Please explain on a separate page and give to the OP Inspector.

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CHAPTER SIX
NAVIGATION AND INTERIOR COMMUNICATIONS GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

6.1. Preparations.

Upon arrival, provide the inspector a package tailored to the navigation (NE) inspection area containing the information listed in Chapter 1, Section 7 and the items below:

(1) Certification and measurements of arc of visibility of navigational lights.

(2) U.S. Certificate of Admeasurement and Suez Canal Tonnage Certificate if built to specifications (keel laid after 1970). Suez certificate only, if built between 1965 and 1970.

(3) COSAL allowance pages for all portable navigation equipment, night vision equipment, and weather monitoring equipment (e.g., Portable foghorn, binoculars, bearing circles, barometers, anemometers, night vision goggles, sextants) (Use highlighters to mark applicable sections or columns for your ship.)

(4) Provide a list of commercial equipment installed, and attach copies of the authorizing Shipalt/A&I instructions.

6-2. General Information.

a. Have all portable navigation equipment, weather monitoring, and night vision equipment available on day one.

b. Have a list of any missing or broken equipment. Use COSAL for allowance requirements.

6-3. Inspection Routine.

a. The inspection is material oriented and normally consists of two phases: The underway phase and the open and inspect phase. Upon completion of the inspection, the findings are debriefed. The duration of the inspection is usually four days.

b. PMS Maintenance Requirement Cards are the primary references for equipment inspection. NAVSEA Building Specifications, NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, General Overhaul Specifications for Deep Diving SSBN/SSN Submarines are also used.

6-4. Underway Phase. During the underway phase equipment is checked to design specifications in an operating environment. The underway phase starts the first day and is complete by the afternoon of the third day. The underway phase is comprised of an outbound surface transit, a submerged period, a test depth period, a second submerged period (if required) and an inbound

surface transit. Some of the demonstrations that are conducted during this phase include:

a. Outbound Surface Transit Period

(1) Piloting (Periscope, radar, sonar).

(2) Obtain three additional fixes, using all available sources including radar and coordinate timing to GPS fix.

(3) Monitor the secure fathometer (Tridents).

(4) Monitor the underwater log.

(5) Radar equipment including video displays, MDS measurement and portable radar.

(6) Inertial navigation equipment (SINS, DMINS, ESGN, etc.).

(7) Electronic NAVAIDS equipment (GPS, LORAN, and Trident secure fathometer).

(8) Conventional NAVAIDS equipment (Sextants, signal lamps, binoculars, etc.).

(9) Gyrocompass, bearing repeaters and synchronous amplifier comparisons.

(10) Periscope optics and camera systems.

(11) Complete one pier-side navigational fix using all sources and compare to visual periscope fix (prior to underway).

b. Submerged Period

(1) Monitor inertial navigation equipment during steep angle operations.

(2) Monitor navigational equipment for abnormalities (After test depth testing is completed).

(3) Gyrocompass and repeaters.

(4) Bridge suitcases.

(5) MC systems and alarms.

(6) Metering and indication system.

(7) Static frequency converters/inverters for the MK-19 gyrocompass.

(8) 31MC and associated batteries.

(9) Engine order telegraph (operational demonstration).

c. Inbound Surface Transit Period

(1) Complete underway ship fix positions using all sources.

(2) Radar Fischer plots (If not completed during outbound transit).

d. Interior Communications Area (If not completed during submerged portion)

(1) Oxygen generator (Normally inspected by an atmosphere control technical assistant).

(2) Bilge and flood alarms.

(3) Electronic cooling system.

(4) Electronic auxiliary fresh water (EAFW) alarms.

(5) Tank level indicating system.

(6) Central atmosphere monitoring system (CAMS).

(7) Operation of shaft revolution indicator.

(8) Ship's entertainment systems.

(9) Sound powered phone circuits.

(10) MC stations.

(11) Dial telephone system (If applicable).

(12) Salinity indicators.

(13) Interior communication switchboards.

(14) Hovering or depth control systems (in conjunction with auxiliaries inspector).

(15) Automatic maneuvering system/depth and course keeping (as applicable, in conjunction with auxiliaries inspector).

(16) Depth detector.

6-5. Open and Inspect Phase. The INSURV inspector will establish the list of equipment to be inspected during the open and inspect phase. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the INSURV

inspector's return at 0800 following the underway period. The significance of being completely ready at this time cannot be overemphasized. The following is a list of systems or components which may be inspected during this phase. Equipment may be added or deleted from the list as performance dictates.

a. Sail interior, masts and mast wells.

(1) Install race track (Must be done on day of return to port, NOT during the Open and Inspect day).

(2) Raise and clamp all masts and antennas in the fully raised position. Do not clamp periscope barrels and the radar mast. Periscopes should be tagged on the bars to allow for mast well inspection. The induction mast may be lowered and tagged out if clamps are unavailable or not approved for use. Have the Nav ID mast fully raised prior to sail tagout (if applicable).

(3) Remove sail access plates necessary for access to all sail interior areas.

b. Bridge and bridge trunk.

c. Sail exterior and fairwater planes' surfaces.

d. Periscope and mast wells.

e. Interior Communications Area.

(1) Visually inspect all sections of the Ballast Control Panel (BCP) (Permission to work in the vicinity of energized equipment required).

(2) Visually inspect all sections/components of the Ship Control Panel (SCP) (Permission to work in the vicinity of energized equipment required).

CHAPTER SEVEN
WEAPONS/DECK GUIDANCE FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

7-1. Preparations.

a. On arrival, provide the Inspector a package tailored to the Weapons/Deck (WP) inspection area containing the information listed in Chapter 1 Section 7, and the items below:

(1) A copy of the most recent Combat System Readiness Review (CSRR), if conducted within six months.

(2) Torpedo Tube instrumented waterslug data.

(3) AELs for man overboard equipment, helicopter transfer equipment, and liferafts.

(4) AELs for MK 48/ADCAP, torpedo tube, tomahawk, and Mine (as applicable) special tools.

(5) AEL for diver gear.

b. The documents listed below will be reviewed during the course of the inspection. They should remain in their normal stowage location until requested by the Inspector.

(1) Most recent Docking Report and Hull Board Survey Report.

(2) Current Salvage Inspection Report and report of corrective action.

(3) Ship's Index of Technical Publications (ITP) or Publication Allowance List (PAL).

(4) Weight Handling Equipment Test Records and current recall list for ship’s portable weight handling gear and weapons handling/shipping equipment. (TLMD)

(5) Sonar Logistics Audit Report indicating status of corrective action (CT, post overhaul/DMP MI only).

(6) Fire Control Logistics Audit Report indicating status of corrective action (CT, post overhaul/DMP MI only).

(7) Weapons system certification documentation (CT only).

(8) The latest NAVSEA Acoustic Trials Data Report (or TOMA report or quicklook message as applicable), and the ship's Platform Noise Survey binder or program.

(9) Divisional pre-underways.

7-2. General Information.

a. Warshots or shapes will be used for torpedo tube loading demonstrations on the surface and at test depth. Training units or shapes should be used if possible.

b. Because the evolutions conducted within the torpedo room during the INSURV inspection are somewhat involved, the following preparations are recommended:

(1) All torpedo tubes should be empty at the commencement of the trial to facilitate internal inspections of the tubes.

(2) The number of weapons and temporary berthing/ stowage racks carried in the torpedo room should be minimized to allow efficient accomplishment of the test depth events.

(3) All evolutions within the torpedo room must be well planned, especially the test depth items. When planning the test depth torpedo room operations, it is helpful to remember that three inch launcher operations will also be conducted at test depth.

c. The inspection is focused on material condition (vice tactical proficiency).

d. PMS Maintenance Requirement Cards, Ship Systems Manuals (SSM), and technical manuals are the primary references for equipment inspection. Type Commander's directives, General Overhaul Specifications for Deep Diving SSBN/SSN Submarines and General Specifications for U.S. Naval Ships are also used.

e. Some inspections may take place during the open and inspect day while the board is conducting the administrative phase. An example of this is VLS mechanical checks. Any equipment deficiencies that can not be processed electronically (for inclusion into final report and upload into ship's CSMP) due to time constraints will be passed directly to the work center supervisor.

7-3. Inspection Routine.

a. Prior to underway, the inspector will observe ship's force cycle the escape trunk upper hatches. He will observe this topside. This demonstration requires coordination between the operator (belowdecks) and the supervisor (topside).

b. Testing not constrained by depth. Some tests are typically commenced during the surface transit, but may be performed during the submerged part of the inspection. Surface testing items should not cause a delay in submerging the ship if they are not yet completed when the ship is ready to dive. These items can be completed upon return to port if required. Some of the demonstrations that are conducted during this phase include:

(1) Weapons data converter diagnostic testing.

(2) General Fire Control system testing.

(3) AN/UYK-7, AN/UYK-43 testing.

(4) Fathometer observation and testing.

(5) Torpedo tube loading (each weapon in each tube).

(6) Open torpedo tube muzzle doors with the hydraulic hand pump.

(7) Torpedo tube instrumented waterslugs (prior to board arrival).

(8) Inspect ten life preservers (each type carried).

(9) Inspect/Inventory the man overboard bag against SSM and AEL.

(10) Inspect/Inventory the helicopter transfer gear against SSM and AEL.

(11) Conduct three inch launcher interlock checks per MRC. This should be commenced as soon as possible, to be completed while on the surface. If it cannot be completed while on the surface, it should be deferred until the ship returns to port.

(12) Inspect/Inventory the ship’s scuba diving equipment against the AEL. After the board's arrival the ship’s Leading Diver should contact the WP inspector, who will provide a marked-up AEL with items for inspection.

(13) Small arms inspection.

(14) Pyro/Ammo flood system test per MRC.

7-4. Underway Phase. During the submerged phase equipment is checked to design specifications in an operating environment. Some of the tests/demonstrations that are conducted during this phase include (some are specific test depth items):

1. Submerged Testing

a. Torpedo and Fire Control

(1) Demonstrate the fire control system by conducting tests particular to the ship's fire control system selected by the INSURV inspector from applicable publications and MRCs. These tests will include: Computer confidence tests, memory port

I/O test, console POFA test, WDC diagnostics and disc drive performance tests. These events are conducted concurrently with other events during the underway period.

(2) Transmission checks will be conducted on all weapons for which the fire control system is capable. An appropriate test set will be used.

(3) While running at maximum speed on the surface, fire torpedo tube water slugs remotely from fire control.

b. Sonar

(1) Demonstrate the active systems in all modes and submodes of operation.

(2) Demonstrate all the modes of passive broadband.

(3) Compare navigational inputs for course and speed.

(4) Demonstrate fathometer and underwater telephones.

(5) Demonstrate the under-ice sonar if installed.

(6) Test/operate all auxiliary sonar systems on board and conduct operational PMS MRCs as applicable.

c. Missile Launcher and Fire Control (SSBN)

(1) Demonstrate the missile fire control system by conducting missile fire control system tests selected by the INSURV inspector from applicable publications and SMPs.

(2) Conduct a Weapon System Readiness Test (WSRT).

(3) Demonstrate the missile launcher system by conducting tests particular to the launcher subsystem (e.g. weapons power, missile heating and cooling, environmental monitoring). Tests will be selected by the INSURV inspector from applicable publications and SMPs. These events are to be conducted concurrently with other events during the underway period. An example of such testing is strategic missile tube pressurization leak check per applicable WP.

d. Torpedo Tube Operations

(1) Shoot a water slug from each tube using the torpedo tube control panel at ahead flank submerged.

(2) Equalize impulse tank and inspect all torpedo tubes for slide valve and stop bolt housing leakage (test depth).

(3) Shoot a water slug from each tube using the hand firing keys (test depth).

(4) Equalize and cycle torpedo tube muzzle doors and ejection pump doors normally and shut with emergency flood control (test depth).

(5) Load and backhaul weapons or shapes from each tube. Each weapon capable (whether actually certified or not) of being carried by the ship will be observed for each tube, unless the inspector agrees in advance to a lesser amount based on observation of tube loading on the surface (test depth).

(6) Demonstrate that weapons or shapes can be transferred to and locked in each stowage position (test depth).

e. Three Inch Launcher Operations

(1) Shoot one water slug from each launcher, firing from the control/attack center (remote pneumatic). This can be accomplished at any speed and depth.

(2) Launch a SATCOM buoy from one launcher specified by the inspector. This can be done at any depth and speed (within specified limits) and should be launched using power ejection from LCDP (local/pneumatic).

(3) Launch one SSXBT from one launcher specified by the inspector. This can be done at any depth and speed (within specified limits) and should be launched using power ejection from LCDP (local/pneumatic). This test is normally conducted at shallow depths.

(4) Hand ram one water slug from each launcher at any depth and speed.

(5) Load and back haul one inert shape from each launcher (test depth). The inspector or parent squadron will provide the inert shape.

f. External Countermeasures Launch system (as applicable). Demonstrate operation of external countermeasure device launching system by launching devices (CT only).

g. Vertical Launch System. INSURV conducts only minor VLS testing during the underway, such as operability and performance tests in accordance with OD 44979 and applicable PMS.

h. Towed Array/Noise Monitoring

(1) Deploy the TB-16. Conduct radiated noise monitoring using TB-16, noise monitoring hydrophones, and hull vibration survey (slow speed with standard machinery lineup). This is typically conducted on the first night of the inspection. Upon completion, the TB-16 should be retrieved at maximum retrieval speed allowed by SSM. The ship will be expected to convert hull

vibration survey measurements to RNE data while underway using onboard equipment and software. Lack of this capability is usually considered to be a significant deficiency.

(2) Deploy all towed arrays at minimum speed permitted by SOE and SSM (Test Depth). Operationally check, then retrieve, the thin line towed array at maximum speed permitted by SOE and SSM (at Test Depth). Leave the TB-16 array out for additional testing if required. If operations with the TB-16 are complete, retrieve it.

(3) Check propeller cavitation using noise monitoring hydrophones, compare to class cavitation curve.

2. Surfaced, inbound transit testing

a. While on the surface transit inbound, conduct anchor operations (all operations to be conducted per SSM):

(1) The ship shall be lying to on the surface in (typically) 30-40 (60-65 for CT) fathoms of water.

(2) The anchor will be made ready for letting go, with snubbing scope set at 30 fathoms. If anchoring in less than 30 fathoms, set snubbing scope at water depth.

(3) Release the anchor per SSM.

(4) Engage the band brake and demonstrate its ability to hold.

(5) Engage, then disengage, the chain locking device.

(6) At this point the clutch may or may not be engaged depending on whether it was engaged to line up the chain locking device. If the clutch is not engaged, then engage it.

(7) Bring in the anchor with the windlass. Demonstrate satisfactory retrieval rate.

(8) If the anchor did not free fall on the first attempt, it will be necessary to walk it out approximately 1 fathom and make a second attempt at free fall. If the anchor does not free fall at this point, it is retrieved and the test is secured. If the anchor successfully free falls the second time, then at the completion of the test (after the anchor has been completely retrieved) it will be necessary to again make the anchor ready for letting go, and determine if it free falls from the fully housed position. Demonstrate that the anchor can be retrieved at a satisfactory rate.

b. Towing Gear (SSN): This is typically inspected during the inbound transit. The sonar access sphere is ventilated, gas-free, and authorized for entry. Any mooring lines are removed from the

access, and the inspector then enters for inspection. The alternative is to wait until the ship returns to port; if this happens, the ship should ensure that the sonar sphere access is satisfactorily gas-free certified.

c. Topside

(1) The inspector will go topside concurrently with the topside linehandlers.

(2) Topside demonstrations include rolling cleats, raising/testing/lowering the capstan, walking the safety track with a deck traveler and lanyard, visually checking topside cavities (e.g., frame 32 for 688 class SSNs), and cycling any escape trunk upper hatch that has not yet been observed from topside. If any demonstrations cannot be conducted due to operations (bringing tugs alongside) or weather, they will be conducted immediately after mooring or during the open and inspect phase.

d. (SSBN only) Conduct Battle Readiness Test (BRT) as soon as possible during inbound transit. This may be upon mooring.

7-5. Open and Inspect Phase. The INSURV Inspector will establish the list of equipment to be inspected during the open and inspect phase. Equipment should be disassembled for inspection and to allow obtaining critical measurements prior to the Inspector's return at 0800 following the underway period. The significance of being completely ready at this time cannot be overemphasized. The following is a list of systems or components which may be inspected during this phase. Equipment may be added or deleted from the list as performance dictates.

a. VLS Testing. The timeline for testing will depend on several factors such as which tubes contain AURES. Close liason between ship's force and the insurv inspectors is required to ensure that this system is tested thoroughly and efficiently.

(1) Upon return to port, the ship will install the VLS platform. A VLS platform, if used, must be installed immediately upon return to port, NOT on the morning of the Open and Inspect day. It has been shown to be possible to conduct testing with no platform installed. This is a ship / ISIC decision; safety is paramount throughout all phases of the inspection.
Following installation of the platform, the ship should conduct testing on tubes with AURES installed.

(2) Electrical testing consists of "green board and shooting" the tube in several modes, plus repeating the process with the SWIM each side (if applicable), then conducting fault testing as time allows.

(3) During the Open and Inspect Day, VLS electrical testing should start at 0700, and complete no later than 1100.

This will normally not include the tubes with AURES, which get inspected on the day of return to port.

(4) Mechanical testing includes bathtub area visual inspections, hatch cycling, locking mechanism checks, and selected valve internal inspections. Some of this is conducted on the day of return to port and some is conducted on the open and inspect day after completion of electrical testing.

b. Life rafts (SSN). They should be on the pier inside their protective covers, ready to inflate by pulling the CO2 activation lanyards.

c. Weapons Loading Equipment. This is normally inspected during the underway phase on a not-to-interfere basis with other demonstrations. If further inspection is deemed necessary it will be conducted during this phase. Ship's force may be requested to fully or partially set up and demonstrate this equipment to support inspection.

d. Capstans.

e. Superstructure (SSBN). This takes several hours and requires one dedicated ship's force escort.

f. Mooring lines.

g. All life lines and stanchions.

h. Missile muzzle hatch timing and inspection (SSBN). This should start early on open and inspect day and be completed no later than 1100.

i. Towing equipment (SSN).

j. Retractable Cleat/Bullnose (if accessible).

k. Impulse tanks. The ship should be prepared to conduct entry on both tanks. This includes work packages, gas free services, and replacement access cover gaskets. The decision whether to enter an impulse tank will be made during the underway phase.

l. TB-16 Towed Array components.

m. J-Bar davit and associated components, including weight test record review.

7-6. Weapons Shipping, Loading, and Handling for Combined Trials. This is conducted the day before the normal pre-underway phase.

a. Prerequisites

(1) One shape for each weapon the ship is capable of launching should be in the torpedo room.

(2) The torpedo room and topside should be rigged for weapons shipping with all shapes in the torpedo room and one shape on the shipping line ready to off-load when the Weapons Inspector arrives.

b. Procedure

(1) Inspect the shipping line (accomplished during shipping evolutions).

(2) Shipping evolution will consist of off-loading each shape one at a time, changing shipping harnesses on the pier (if applicable) and then on-loading the shape.

(3) Shapes will be tube loaded to the stop bolt in each torpedo tube. Shapes will be indexed as necessary so that all stows and hoists are exercised. This should be accomplished on a not-to-interfere basis with the shipping evolution.

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CHAPTER EIGHT
DAMAGE CONTROL GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICER(S) AND SUPERVISORS

8-1. Preparations.

1. Documentation

a. On arrival, provide the inspector a package tailored to the Damage Control (DC) inspection area containing the information listed in Chapter 1, Section 7.

b. The below listed documents will be reviewed during the course of the inspection:

(1) Last External QA Audit (URO portion).

(2) Departure from Specifications Log.

(3) Ship's FLASH file.

2. Materials. Proper scales per MRCs including scale used to weigh CO2 and AFFF fire extinguishers (0 - 60 pound), the scale for PKP extinguisher CO2 cartridges (0 - 65 ounce) and the scale for LIOH canisters (0 - 10 pound).

8-2. Inspection Routine.

1. The inspection is material oriented. During the pre-underway and underway phases, most DC equipment will be inspected. Additionally, at test depth escape trunk equipment and appliances are checked. All doors (watertight and non-watertight), lower hatches to bridge and escape trunks, and bulkhead flappers are checked for mechanical operability in accordance with MRCs A-080/A-1, and A-2 and all upper hatches are inspected for leakage.

2. PMS Maintenance Requirement Cards are the primary references for equipment inspection. NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, General Overhaul Specifications for Deep Diving SSBN/SSN Submarines and General Specifications for U.S. Naval Ships are also used.

3. The DC inspection is a tour of the ship beginning at a time selected by the Inspector, usually early on the first day. The DCPO and a helper should plan on accompanying the Inspector. They should bring the required scales for weighing fire extinguishers and replacement seals for opened damage control equipment. The DCPO must be off of the watchbill during the underway period.

4. The DCA (Or QA officer, if applicable), will present the Departure Log and URO records to the Inspector at a mutually agreed time. The Departure Log is inspected to determine whether there has been an adequate long-term effort to clear outstanding

departures. In addition, the Board may inspect recently completed work packages for conformance to requirements.

5. Prior to submerging the Ship's Diving Officer will brief the Senior Inspector concerning all rig for dive deficiencies. Following the dive he will brief compensation and SOE as directed by the Senior Inspector.

CHAPTER NINE
HABITABILITY GUIDANCE NOTES FOR EXECUTIVE OFFICER AND CHIEF OF THE BOAT

9-1. Preparations. On arrival, provide the inspector a package tailored to the Habitability (HB) inspection area containing the information listed in Chapter 1, Section 7.

9-2. Inspection Routine.

1. The inspection is material oriented. It normally consists of a tour of the ship habitability areas. The COB and a recorder should accompany the inspector during the tour. The tour is normally conducted during the Maneuvering Watch once the COB has completed his topside responsibilities. For SSBNs, this will normally be done during the inbound Maneuvering Watch.

2. The Inspector will note the cleanliness, storage, and general material condition of the spaces. The COB should arrange for fast and easy access to all lockers before the tour commences.

3. Provide separate listing of the following deficiencies: Formica, Naugahyde, deck coverings (tile, terrazzo, lonmat, flashing, deck plates), locker closures and door closures. Include a disk with all deficiencies in word format.

4. Areas of habitability concern should be discussed with the inspector. Include concerns regarding access and stowage modified by SHIPALTs etc.

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CHAPTER TEN
SUPPLY GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

10-1. Preparations. On arrival, provide the inspector a package tailored to the Supply (SP) inspection area containing the information listed in Chapter 1 Section 7 and the items below:

1. Provide copies of the APL/AELs listed in Table 10-1. Copies should be provided in the individual inspector's packages as indicated.

2. (For CT and GMI only) If SNAP equipped, provide the following additional information as of the first day of the inspection:

a. Printout of ship's material outstanding file in JCN and requisition number sequence (RPT 073).

b. Printout of the stock status listing (parameter selection) (report 042) for special material identification codes L1 and SS.

c. Printout of the stock status listing (parameter selection) (report 042) for COSAL type code MAM.

d. Copy of most recent MAMS inventory and ships instruction for inventory control of stock material in the custody of other department heads.

3. (For CT and GMI only) Results of a 100 percent maintenance assistance modules (MAMS) inventory conducted no earlier than one week prior to the start of the inspection.

4. (For CT and GMI only) Copy of the most recent Logistics Readiness Evaluation (LRE) Report.

10-2. Inspection Routine.

1. The inspection is material oriented; however, key records and programs needed for the support of the ship's material condition are reviewed. Upon completion of the inspection, the findings are debriefed.

2. The following equipment will be inspected:

a. Dishwasher.

b. Sanitizing sinks.

c. Deep fat fryer including accomplishment of the deep fat fryer high temperature trip test IAW MRC procedures. This test may require new grease prior to being performed.

d. Grills and ovens.

e. Range and deep fat fryer vent closing mechanism and Gaylord hood.

f. TDU and associated equipment (Note: TDU should be left flooded at the completion of TDU operations prior to the deep dive). This portion of the inspection is coordinated with the Auxiliaries inspector.

g. Soft ice cream freezer/dispenser.

h. Pantry warming oven.

i. Reefer door emergency release mechanism.

j. Ice maker.

k. Humidity proofer.

l. All portable equipment, such as meat slicer and tenderizer.

m. All permanently mounted equipment, such as the food mixing machine and steam kettle.

n. All dry and refrigerated provisions stowages.

o. The galley and messing areas.

p. Galley Fire suppression systems such as the Aqueous Potassium Carbonate (APC) system and associated ductwork and equipment.

3. (CT and GMI only) Be prepared to perform the following inventories:

a. Usage and non-usage inventories for HME and Q repair parts.

b. Operating Space Items (OSI).

c. All repair parts lockers and bulk parts stowages.

4. (CT and GMI only) A Material Obligation Validation (MOV) conducted on both stock and Direct Turn Over (DTO) repair part requisitions.

5. (CT and GMI only) Be prepared to discuss the adequacy/status of:

a. Provisions and repair parts stowage.

b. Repair parts support for installed equipment.

c. Initial outfitting repair part shortages.

d. Pending COSAL maintenance.

e. Any serious physical limitation of supply spaces.

Table 10-1

INSURV APL/AELs FOR INVENTORY

Please provide copies of the following APL/AELs in the inspection packages as noted prior to the Board's arrival. The copies should come from your COSAL. If you have SNAP and without a hard copy COSAL, you must get provisioning hard copy APL/AEL copies from microfiche. If you do not carry the exact APL/AEL number listed below, then provide a copy of the APL/AEL you carry on board. (You will be conducting inventories from these allowance lists.)

Damage Control Package

CO2 EXTINGUISHER	2-930054001 THRU 54003 640140005
PKP EXTINGUISHER	2-930054090 AND 54091 640130198
AFFF EXTINGUISHER	2-930054130 AND 54131 649990011
AFFF CONCENTRATE	2-930034028 AND 34029
FIRE HOSES AND ACCESSORIES	2-930013001 THRU 13003
TOOL ROLL	2-880043004
MATERIAL BAG	2-880043003
BANDIT KIT	2-880043002
PIPE PATCH KIT	2-880044008
OBA	2-930093005 AND 93006 2-930094060 AND 94061
OBA TRAINING CANISTER	2-930094003
OBA AUDIO PROJECTION UNITS	2-930094070 AND 94071
LIOH CANISTERS AND 23036	2-330023031 THRU 23034
AIR FED STEAM SUIT	2-930093002
MK V/MCU-2P GAS MASK	2-990990522 OR 470030001/2/3
FIRE FIGHTING ENSEMBLES	2-930094085

ANTI-FLASH GEAR	2-330024080
THERMAL IMAGER (NFTI)	2-930094090
EAB MASK	2-330023070
ESCAPE TRUNK EQUIPMENT	2-330023001
DIVING EQUIPMENT	2-950013004
DIVING WATCH	2-240054124

Weapons Package

HELO TRANSFER KIT	2-330023065
LIFE RAFT MK-4/2	2-820393001
MAN OVERBOARD BAG	2-330023011 AND 23061
SWIMMING EQUIPMENT (SSBN)	2-950014016
SUB ESCAPE X SAFETY APPLIANCES	2-330023012, 13018 AND 13020
HARNESS ASY SUB SAFETY TRACK	2-330023055 THRU 23057
TORPEDO TUBE TOOLS 63/65/67	0-006320385
MK 48/ADCAP TORPEDO TOOLS	0-006350001
TOMAHAWK (UGM-109) TOOLS	0-005750131

Auxiliary Package

LUBRICATION EQUIPAGE	2-920013215
DIESEL GENERATOR TOOLS	665360197, 221, 222 AND 250
O2 GENERATOR TOOLS	169140030S, 36S, 37S, 40, 41, 46S, 51S, 56S, 60S, 62S, 71S, 72S AND T169140039, 0078

Operations Package

AN/WSN-3 ESGN TOOLS	2-240074035, 2-670034075
AN/WLR-8 MAINTENANCE TOOLS	30737980

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CHAPTER ELEVEN
MEDICAL GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

11-1. Preparations. On arrival, provide the inspector a package tailored to the Medical (MD) inspection area containing the information listed in Chapter 1, Section 7. A list of medical lockers, narcotics stowage locations, poison antidote locker(s), first aid lockers, gun bags, oxygen resuscitator(s), litters and personnel transfer equipment, and portable atmosphere monitoring equipment. SAMs generated master inventory.

11-2. Inspection Routine.

1. The inspection is material oriented. The medical area inspection is not dependent upon any special ship condition. Upon completion of the inspection, the findings are debriefed.

2. PMS Maintenance Requirement Cards are the primary references for equipment inspection. OPNAV instructions, NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines, are also used.

3. During the course of the inspection, the following items will be viewed in the company of the ship's Medical Department Representative:

a. Medical space(s).

b. Medical material stowage and lockers.

c. Narcotic stowage.

d. Poison antidote stowage/lockers.

e. First aid lockers.

f. Gun bags.

g. Oxygen resuscitator(s) and cylinders.

h. Litters and personnel transfer equipment.

i. Portable atmosphere monitoring equipment.

j. Decontamination equipment.

k. Medical and surgical areas, including emergency lighting.

l. Potable water systems (Potable water hose locker(s), hoses, tank level indication, and calcium hypochlorite stowage).

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CHAPTER TWELVE
OCCUPATIONAL SAFETY AND HEALTH GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

12-1. Preparations.

1. On arrival, provide to the inspector a package tailored to the Occupational Safety and Health (OSH) inspection area containing the information listed in Chapter 1, Section 7, and the items below:

2. The below listed equipment will be inspected and reviewed during the course of the inspection:

a. Local safety program instructions.

b. Records of safety training.

c. Records of HAZMAT training.

d. Records of Safety Council and committee meetings.

e. Records of ship conducted safety walk-throughs.

f. Accident injury reports.

g. Mishap reports.

h. NAVOSH hazard log.

i. Current HAZMAT inventory.

j. Heat stress survey records for the last year.

k. Baseline and any periodic industrial hygiene surveys.

l. Most recent shipboard noise survey.

j. Asbestos Control Program.

h. Atmosphere Control Program.

i. Back Injury Training.

j. Eye Wash Stations.

k. Gas Free Program.

l. Hazardous Equipment (Lathe, Drill Press, Grinders).

m. HAZMAT Program.

n. Heat Stress Program.

o. Hearing Conservation Program.

p. Lead Control Program and Training.

q. Sight Conservation Program.

r. Traffic Safety Program.

3. Heat stress monitoring equipment will be required to support the inspection.

12-2. Inspection Routine.

1. The inspection is material oriented; however, key programs are reviewed to verify their implementation. The inspection normally consists of three phases: Pre-underway phase, underway phase and post underway phase. Upon completion of the inspection the findings are debriefed.

2. PMS Maintenance Requirement Cards are the primary references for equipment inspection. Program evaluation is conducted based upon references (j) and (k). NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines, are also used.

3. The OH Inspector will conduct a walk-through of the ship in the company of the ship's Safety Officer. The following items will be viewed and requested to be demonstrated as applicable:

a. Respiratory protection.

b. Sight conservation.

c. Heat stress.

d. Thermal insulation rip-out kit, if required.

e. Compressed gas cylinder stowage.

f. Shop safety (e.g. Deck striping and non-skid, equipment grounding, personal protective equipment, and warning signs).

g. Crew safety awareness.

h. Hazardous Material stowage and use. Specifically: flammables, acids, corrosives, and calcium hypochlorite.

CHAPTER THIRTEEN
ENVIRONMENTAL PROTECTION GUIDANCE NOTES FOR DEPARTMENT HEAD, DIVISION OFFICERS AND SUPERVISORS

13-1. Preparations.

1. On arrival, provide to the Inspector a package tailored to the Environmental Protection (EP) inspection areas containing the information listed in Chapter 1, Section 7.

2. The below listed documents will be reviewed during the course of the inspection to ensure the following are in compliance with reference (e) and (m).

a. Air Pollution training records.

b. Annual Environmental Protection Training.

c. Environmental Protection Program.

d. Oily Waste Procedures.

e. Oily Waste Program.

f. OHS Spill Contingency Plan.

g. Oil Handling Training.

h. Medical Waste Program.

i. Medical Waste Training.

j. ODS Handling Training.

k. Oil Pollution Abatement Program.

l. Solid Waste Program.

m. Solid Waste Handler Training.

13-2. Inspection Routine.

1. The inspection is material oriented; however, key programs are reviewed to verify their implementation. The inspection normally consists of three phases: Pre-underway phase, underway phase and post underway phase. Upon completion of the inspection the findings are debriefed.

2. PMS Maintenance Requirement Cards are the primary references for equipment inspection. Program evaluation is conducted based upon references (l), (m) and (n). NAVSEA technical manuals, equipment technical manuals, Type Commander's directives, and General Overhaul Specifications for Deep Diving SSBN/SSN Submarines, are also used.

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SSN INSURV Agenda

Day 1 (typically TUE for SUBLANT, MON for SUBPAC)

1200 Board arrives
- ❑ TLD brief in crew's mess
- ❑ Senior Member and CO meet in CO's stateroom

1230 Inbrief for Officers and LPOs in crew's mess

1300 Maneuvering watch
- ❑ Cycle escape trunk upper hatches. Inspector observe from topside.

1400 Underway
- ❑ Habitablity inspection (after COB comes belowdecks)

TBD Secure the maneuvering watch

TBD Surfaced testing (3-4 hours, usually less than transit)
- ❑ Trim and Drain pump electrical component inspections
- ❑ Trim and Drain pump strainer inspections
- ❑ Max surfaced speed testing
- ❑ Control surface testing
- ❑ Ahead steering gear checks *
- ❑ Propulsion maximum surface speed checks *
- ❑ Torpedo Tube water slugs (from control)
- ❑ Snorkel
- ❑ Propulsion crashback *
- ❑ Sustained backing bell for astern steering gear checks *
- ❑ Overspeed port SSTG
- ❑ Port main condenser vacuum drop test
- ❑ Piloting, Navigation, Radar checks (both radars)
- ❑ Torpedo tube loads
- ❑ Three inch launcher interlock checks
- ❑ Pyro/Ammo flood test
- ❑ Small arms inspection
- ❑ Lifesaving gear inspection
- ❑ Communications testing
- ❑ IFF and ESM checks. Requires coordination with off-hull site

* Affects transit time to dive point

TBD Dive to Periscope depth - PD testing (1-2 hours)
- ❑ Snorkel
- ❑ Conduct special comms testing.
- ❑ Cycle masts at maximum allowed speed (only if control is rigged for white)
- ❑ Measure periscope turning torque (only if control is rigged for white)
- ❑ TDU interlock test

SSN INSURV Agenda

TBD Submerged testing
- ❑ Warm up still to support large angles
- ❑ Deploy FWA. Conduct comm checks. Retrieve FWA.

Day 2

0000 Radiated noise monitoring: TB-16 Los cuts with Hull vibration monitor survey (HVMS) at standard machinery lineup. Retrieve TB-16 at max speed allowed.

0700 Periscope depth operations
- ❑ Cycle masts at max allowed speed (if not yet completed)
- ❑ Measure periscope turning torque (if not yet completed)
- ❑ Prepare for angles and deep dive. Ensure evaporator, scrubbers, still and EOG running

0800 Vibration reducer test: 150 ft to 1/2 TD and back using 7 degree angle and AA 2/3

0810 Large angles: Three sets of down/up using 25 to 30 degrees. Maneuvering to conduct electric plant shifts between sets. One set at NFPLU, one set HPLU each side.

0900 Cycle control surfaces full throw at TD-100 ft

0930 Deep Dive (approx. 4 hours)

Main Propulsion Evolutions:
- ❑ Shift shaft seals
- ❑ Cycle port MSW flood control
- ❑ Cycle ASW flood control
- ❑ Cycle stbd MSW flood control
- ❑ STBD main condenser vacuum drop test
- ❑ Overspeed STBD SSTG

Weapons Department Evolutions:
- ❑ Deploy and retrieve both towed arrays
- ❑ Torpedo Tube loads
- ❑ Cycle torpedo tube flood control
- ❑ Load and backhaul three inch launcher inert shape (provided by inspector)
- ❑ Shoot waterslugs from torpedo tubes using hand firing key
- ❑ Slide valve leak checks

Auxiliaries Evolutions:
- ❑ Cycle MBT vents by power and hand
- ❑ Sanitary pump capacity check
- ❑ HEX timing checks
- ❑ Cycle AMR flood control
- ❑ Trim pump capacity check-after towed array evolutions
- ❑ Drain pump capacity check-after towed array evolutions

Senior Member/DC Evolutions:
- ❑ Check all hatches and doors. COB assist.
- ❑ Inspect all escape trunks. 1st LT or Deck LPO assist.

SSN INSURV Agenda

Electrical Evolutions:
- ❑ Diesel electrical inspection
- ❑ Inspect shore power connections in conjunction with Senior Member escape trunk inspection (ensure bus deenergized).

1330 (approx.) Secure from deep submergence - Submerged Testing:
- ❑ Single point cavitation curve check
- ❑ Main engine overspeed limiter checks
- ❑ Check Main Engine Bearing RTE setpoints. AA II to AA III at 5 rpm increments. Cycle rudder hard each side at each increment (NSTM 231)
- ❑ High speed run (approx. 1 hour)
  - ❑ RPFW flow degradation check
  - ❑ Torpedo tube water slugs at ahead flank
  - ❑ Check main engine and reduction gears RTE setpoints
- ❑ Submerged steering and diving gear checks at max speed below engaging dive stop
- ❑ Launch satcom buoy (pneumatic, LCDP)
- ❑ Launch SSXBT (pneumatic, LCDP)
- ❑ Shoot signal ejector waterslugs from control
- ❑ Hand ram signal ejector waterslugs
- ❑ EPM, SPM (shallow operations)
- ❑ Overspeed check for one SSMG
- ❑ SSMG inspections
- ❑ SSTG inspections
- ❑ Install spare diesel governor

TBD EMBT Blow from 400 ft (10 kts, 15-20 degrees)

TBD Surfaced testing:
- ❑ Snorkel on spare governor
- ❑ Conduct antenna resistance checks
- ❑ Blow selected sea chests
- ❑ Conduct communications testing

Day 3

Continue Surfaced testing:
- ❑ Anchor demonstration
- ❑ Sonar sphere/towing gear inspection
- ❑ Conduct Communications testing not yet completed
- ❑ Topside operations (roll cleats, safety track test, operate capstan, inspect topside security light cavity)

SSN INSURV Agenda

TBD Moor
- ❑ Conduct control surface testing
- ❑ Install Sail racetrack-ship must have both sets of tags ready
- ❑ Install VLS platform
- ❑ VLS mechanical inspections
- ❑ Test VLS tubes with installed AURES
- ❑ Ventilate and open RC
- ❑ Reduction gear inspection (MP inspector and ship may elect to conduct this on following day)

Day 4

0700 VLS electrical testing commences

0800 Open and Inspect:
- ❑ Sail inspection
- ❑ Liferaft test and inspection
- ❑ RC inspection
- ❑ Reduction gear inspection (if not already complete)
- ❑ Conduct other open and inspects determined during underway phase

1000 (approx.) Complete Open and Inspect

1400 (approx) Outbrief CO, XO, Dept Heads, COB, 3MC, Dept leading Chiefs (wardroom)

1500 (approx.) INSURV Board departs

Inspectors will work directly with ship’s force to accomplish items that are not specifically listed on this agenda (eg. DC gear inspections, fire control testing, IC system inspections, air systems testing, HPAC inspections, energized switchboard inspections, etc.)

SSBN INSURV Agenda

To complete all agenda items, 48 hours underway are required.

Day 1

BSP Board arrives via BSP
- ❑ TLD brief in crew's mess
- ❑ Senior Member and CO meet in CO's stateroom

BSP+30min Inbrief for Officers and LPOs in crew's mess

TBD Secure the maneuvering watch

TBD Surfaced testing (3-4 hours, usually less than transit)
- ❑ Trim and Drain pump electrical component inspections
- ❑ Trim and Drain pump strainer inspections
- ❑ Max surfaced speed testing
- ❑ Ahead steering gear checks *
- ❑ Propulsion maximum surfaced speed checks *
- ❑ Torpedo Tube water slugs (from control)
- ❑ Snorkel
- ❑ Propulsion crashback *
- ❑ Sustained backing bell for astern steering gear checks *
- ❑ Astern to ahead reversal (Back 2/3 to Ahead Full)
- ❑ Overspeed port SSTG
- ❑ Port main condenser vacuum drop test
- ❑ Piloting, Navigation, Radar checks
- ❑ Torpedo tube loads
- ❑ Three inch launcher interlock checks
- ❑ Pyro/Ammo flood test
- ❑ Small arms inspection
- ❑ Lifesaving gear inspection
- ❑ Man overboard and helicopter transfer gear inventory
- ❑ Communications testing
- ❑ IFF and ESM checks. Requires coordination with off-hull site

  * Effects transit time to dive point

TBD Dive to Periscope depth-PD testing (1-2 hours)
- ❑ Snorkel
- ❑ Conduct special comms testing.
- ❑ Cycle masts at maximum allowed speed (only if control is rigged for white)
- ❑ Measure periscope turning torque (only if control is rigged for white)
- ❑ TDU interlock test

TBD Submerged testing (items may be rescheduled due to time constraints)
- ❑ Conduct pressurized WSRT
- ❑ Conduct hovering operability test
- ❑ Deploy FWA. Conduct comm checks. Retrieve FWA.
- ❑ Deploy TBA. Copy signals. Retrieve TBA. Repeat for other TBA.
- ❑ Warm up still to support large angles

SSBN INSURV Agenda

Day 2

0000 Radiated noise monitoring: TB-16 Los cuts with Hull vibration monitor survey (HVMS) at standard machinery lineup

0700 Periscope depth operations

- ❑ Cycle masts at max allowed speed (if not yet completed)
- ❑ Measure periscope turning torque (if not yet completed)
- ❑ Prepare for angles and deep dive. Ensure evaporator, scrubbers, still and EOG running.

0800 Vibration reducer test: 150 ft to 1/2 TD and back using 7 degrees and AA 2/3

0810 Large angles: Three sets of down/up using 25 to 30 degrees. Maneuvering to conduct electric plant shifts between sets. One set HPLU each side.

0900 Cycle control surfaces full throw at TD-100 ft

0930 Deep Dive (approx. 4 hours)

Main Propulsion Evolutions:

- ❑ Shift shaft seals
- ❑ Cycle port MSW flood control
- ❑ Cycle ASW flood control
- ❑ Cycle stbd MSW flood control
- ❑ STBD main condenser vacuum drop test
- ❑ Overspeed STBD SSTG

Weapons Department Evolutions:

- ❑ Torpedo Tube loads
- ❑ Cycle torpedo tube flood control
- ❑ Load and backhaul three inch launcher inert shape (provided by inspector)
- ❑ Shoot waterslugs from torpedo tubes using hand firing key
- ❑ Slide valve leak checks
- ❑ Deploy and retrieve both towed arrays

Auxiliaries Evolutions:

- ❑ Cycle MBT vents by power and hand
- ❑ Trim pump capacity check
- ❑ Drain pump capacity check
- ❑ Sanitary pump capacity check
- ❑ HEX timing checks
- ❑ AMR flood control checks

Senior Member/DC Evolutions:

- ❑ Check all hatches and doors. COB assist.
- ❑ Inspect all escape trunks. 1st LT or Deck LPO assist.

Electrical Evolutions:

- ❑ Diesel electrical inspection

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1330 (approx.) Secure from deep submergence - Submerged Testing:
- ❑ Single point cavitation curve check
- ❑ Main engine overspeed limiter checks
- ❑ Check Main Engine Bearing RTE setpoints. AA II to AA III at 5 rpm increments. Cycle rudder hard each side at each increment (NSTM 231)
- ❑ High speed run (approx. 1 hour)
  - ❑ RPFW flow degradation check
  - ❑ Torpedo tube water slugs at ahead flank
  - ❑ Check main engine and reduction gear RTE setpoints
- ❑ Submerged steering and diving gear checks at max speed below engaging dive stop
- ❑ Launch satcom buoy (pneumatic, LCDP)
- ❑ Launch SSXBT (pneumatic, LCDP)
- ❑ Shoot signal ejector waterslugs from control
- ❑ Hand ram signal ejector waterslugs
- ❑ EPM, SPM (shallow operations)
- ❑ Overspeed check for one SSMG
- ❑ SSMG inspections
- ❑ SSTG inspections
- ❑ Conduct submerged testing not yet completed
- ❑ Install spare diesel governor

TBD EMBT Blow from 400 ft (10 kts, 15-20 degrees)

TBD Surfaced testing:
- ❑ Snorkel on spare governor
- ❑ Conduct antenna resistance checks
- ❑ Blow selected sea chests
- ❑ Conduct communications testing

Day 3

Continue Surfaced testing:
- ❑ Anchor demonstration
- ❑ Conduct Communications testing not yet completed
- ❑ Habitability inspection with the COB during inbound transit.
- ❑ Topside operations (roll cleats, safety track test, operate capstan)
- ❑ Conduct BRT prior to mooring, or as soon as possible upon mooring.
- ❑ Inspect shore power connections

BSP+48 hours Moor
- ❑ Conduct control surface testing
- ❑ Install Sail racetrack
- ❑ Ventilate and open RC
- ❑ Reduction gear inspection (ship may elect to conduct this on following day)

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Day 4

0800 Open and Inspect:
- ❑ Sail inspection
- ❑ Superstructure walkthrough (1st LT or Deck LPO assist)
- ❑ Cycle Missile Tubes for timing and inspection
- ❑ RC inspection
- ❑ Reduction gear inspection
- ❑ Conduct other open and inspects determined during underway phase

1000 (approx.) Complete Open and Inspect

1400 (Open and Inspect completion time + 4 hours) Outbrief CO and Commodore (location TBD)

1430 (approx.) Outbrief CO, XO, Dept Heads, COB, 3MC, Dept leading Chiefs (wardroom)

1500 (approx.) INSURV Board departs

Inspectors will work directly with ship’s force to accomplish items that are not specifically listed on this agenda (eg. DC gear inspections, fire control testing, IC system inspections, air systems testing, HPAC inspections, energized switchboard inspections, etc.)

INSURV Coordinator note: Some required testing is completed during the first days of refit. Coordinate with your squadron to supply needed data to the INSURV Board Recorder within two weeks after the INSURV board departs.